KADIR HAS UNIVERSITY
SCHOOL OF GRADUATE STUDIES
PROGRAM OF PSYCHOLOGY

INVESTIGATING THE EMOTION REGULATION FUNCTION OF EPISODIC COUNTERFACTUAL THINKING IN AN EMOTIONAL CONTEXT

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MASTER OF ART THESIS

ISTANBUL, MAY, 2023

INVESTIGATING THE EMOTION REGULATION FUNCTION OF EPISODIC COUNTERFACTUAL THINKING IN AN EMOTIONAL CONTEXT

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A thesis submitted to
the School of Graduate Studies of Kadir Has University
in partial fulfilment of the requirements for the degree of
Master of Arts in Psychology

Istanbul, May, 2023

APPROVAL

This thesis/project titled INVESTIGATING THE EMOTION REGULATION FUNCTION OF EPISODIC COUNTERFACTUAL THINKING IN AN EMOTIONAL CONTEXT submitted by EMİNE ŞEYMA ÇAĞLAR KURTULMUŞ, in partial fulfillment of the requirements for the degree Master of Arts in Psychological Sciences is approved by

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DECLARATION ON RESEARCH ETHICS AND

PUBLISHING METHODS

I, EMİNE ŞEYMA ÇAĞLAR KURTULMUŞ; hereby declare

- that this Master of Arts that I have submitted is entirely my own work and I have cited and referenced all material and results that are not my own in accordance with the rules;
- that this Master of Arts does not contain any material from any research submitted or accepted to obtain a degree or diploma at another educational institution;
- and that I commit and undertake to follow the "Kadir Has University Academic Codes of Conduct" prepared in accordance with the "Higher Education Council Codes of Conduct".

In addition, I acknowledge that any claim of irregularity that may arise in relation to this work will result in a disciplinary action in accordance with the university legislation.

Emine Şeyma Çağlar Kurtulmuş

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Date (15/05/2023)

ACKNOWLEDGEMENT

First and foremost, I would like to express special gratitude to my advisor, Assoc. Prof. Sezin Öner Yaman, for her invaluable support and encouragement throughout my master's education. Her vast knowledge and experience have been instrumental in shaping my academic and research skills. She has been a role model for me academically and personally, providing me with the necessary tools and guidance to succeed in my future studies. Beyond academics, I am grateful for her emotional support and motivating presence throughout this long process. Her mentorship has been a source of inspiration to me, and I hope to emulate her qualities as I pursue my own career. I feel lucky and privileged to have been her student.

I am also grateful to my committee members, Prof. Sami Gülgöz, and Assoc. Prof. Aslı Aktan-Erciyes for their valuable contributions to my thesis. Their insightful comments were crucial to completing my research.

I would like to thank my lovely friends Nursena and Şüheda, who have been with me since the beginning of my graduate education. Their constant support has been priceless, especially during challenging times. Their friendship has been a source of joy and comfort.

I would also like to thank my dear friends Dilan and Çağlar from the Memory and Emotion Lab for the wonderful time we spent together. Although it was a short time, we became a great team, and I believe we will have many great collaborations in the future.

I am deeply grateful to my best friends Rumeysa, Ebrar, Aybüke, Merve, and Ayşe, who have been by my side during all the difficulties I have experienced and the most beautiful moments of my life. They always motivated me and encouraged me in my academic and personal life. I am grateful for their friendship.

I would like to express my deepest gratitude to my beloved parents, Ayşegül and İsmail, for their endless belief in me throughout my life. Their confidence in my abilities and emotional support have been instrumental in helping me reach this point in my academic journey. I am proud to have them as my parents, and I appreciate their love and support.

Finally, I have most special thanks to my spouse, Taha Enes, whose support and patience has been meaningful throughout my graduate studies. He has been more than a spouse; my closest friend and study buddy. He has always been there for me, emotionally and academically, whenever I needed him. I hope we will have many more years of learning and having fun together.

Emine Şeyma Çağlar Kurtulmuş

Mayıs 2023

INVESTIGATING THE EMOTION REGULATION FUNCTION OF EPISODIC COUNTERFACTUAL THINKING IN AN EMOTIONAL CONTEXT

ABSTRACT

The main purpose of the study was to investigate how distinct episodic counterfactual thinking (upward and downward) can regulate negative emotions linked to negative autobiographical memories. Previous research indicated that counterfactual thoughts might be an effective tool for regulating emotions, particularly in situations where the thoughts lead to a sense of relief (Roese, 1997). However, there is some controversy regarding the efficacy of counterfactual thinking as a mood-regulating approach (Blix et al., 2018). Accordingly, we argued that episodic counterfactual thoughts, especially downward counterfactuals, could be effective in regulating negative emotions associated with autobiographical memory. We also suggested that a positive emotional context could facilitate the emotion regulation function of counterfactual thinking, as it provides positive representations more available for the individual. In order to test this, participants (N = 114) recalled a negative interpersonal memory and rated its phenomenological features. They were randomly assigned to either a mood enhancing or control group for mood induction, and then were randomly assigned to either an upward or downward counterfactual condition. They were then requested to rate the phenomenological features of these counterfactuals and individual differences such as rumination, religiosity and emotion regulation strategy. As predicted, the results indicated that inducing a positive mood helped participants regulate negative emotions associated with the negative memory. However, contrary to our predictions, engaging in counterfactual thinking led to a decrease in mood, regardless of whether the counterfactual thoughts were upward or downward. The study also explored how counterfactual thoughts with different features affect emotional experiences. Our results indicated that counterfactual thoughts with various features such as emotional intensity, reliving and imagery influence emotional experiences beyond valence, indicating that counterfactual direction alone does not affect emotional processing. According to our final regression model, initial mood measure, rumination, valence, and reliving of

counterfactuals were predictors of subsequent emotional experiences. The findings and their potential explanations were discussed within appropriate theoretical frameworks, providing new insights into this area of research.

***Keywords**:* episodic counterfactual thinking, emotion regulation, autobiographical memory, memory phenomenology, mood, rumination.

DUYGUSAL BAĞLAMDA EPİZODİK KARŞI-OLGUSAL DÜŞÜNCELERİN DUYGU DÜZENLEME FONKSİYONLARININ İNCELENMESİ

ÖZET

Çalışmanın ana amacı farklı türdeki karşı-olgusal düşüncelerin (yukarı doğru vs. aşağı doğru) negatif otobiyografik anılara ilişkin olumsuz duyguların düzenlenmesindeki etkisini araştırmaktır. Geçmiş çalışmalar, karşı-olgusal düşüncelerin olumsuz duyguları düzenlemede etkili olduğunu göstermiştir (Roese, 1997). Fakat karşı-olgusal düşünmenin duyguların düzenlenmesindeki etkililiği konusunda bazı tartışmalar vardır (Blix vd., 2016, 2018). Buna göre, çalışmamızda epizodik karşı-olgusal düşüncelerin, özellikle aşağı doğru karşı-olgusal düşüncelerin, otobiyografik bellek ile ilişkin olumsuz duyguları düzenlemede etkili olabileceğini öne sürdük. Ayrıca, pozitif duygusal bir bağlamın, bireye olumlu temsiller sağlayarak karşı-olgusal düşüncenin duygu düzenleme işlevini kolaylaştırabileceğini bekledik. Bu amaçla, ilk aşamada katılımcılar (N = 114) geçmişte yaşadıkları kişilerarası negatif anıyı hatırlayıp, bu anıyı fenomenolojik özellikler açısından değerlendirmiştir. İkinci aşamada, duygu indüksiyon amacıyla bir grup katılımcıya olumlu ruh halini artırmak için pozitif video izletilirken, diğer grup kontrol grubu olup duygu içermeyen bir video izletildi. Deneyin son aşamasında, katılımcılar ilk oturumda anlattıkları negatif anıları için daha iyi bir alternatif senaryo (yukarı doğru) ya da daha kötü bir alternatif senaryo (aşağı doğru) yazmışlardır. Katılımcılar yazmış oldukları karşı-olgusal düşüncelerinin fenomenolojik özelliklerini ve duygu-durumlarını değerlendirdiler. Tahmin edildiği üzere, pozitif video izleyen grubun ruh hallerinde iyileşme görülürken negatif anılarıyla ilişkin olumsuz duyguları azalmıştır. Ancak hipotezlerimize ters olarak, karşı-olgusal düşüncelerin yazılmasından sonra katılımcılar kendilerini daha kötü hissettiler. Bununla birlikte, keşfedici veri analizinin sonuçlarına göre, karşı-olgusal düşüncelerin türünden ziyade (yukarı doğru vs aşağı doğru), fenomenolojik özelliklerinin (duygusal yoğunluk, yeniden yaşama hissi ve görsel imgelem) duygusal deneyimleri etkilediğini bulduk. Son olarak yaptığımız regresyon analizine göre, bireylerin ilk duygu-durumları, ruminasyon seviyeleri, karşı-olgusal düşüncelerin duygu değerliliği ve bu düşünceleri yazarken hissettikleri yeniden yaşam hissinin duygusal deneyimi yordayan değişkenler olarak

bulduk. Bulgular ve potansiyel açıklamaları uygun teorik çerçeveler içinde tartışılarak, bu araştırma alanına yeni perspektifler sunulmuştur.

Anahtar kelimeler: epizodik karşı-olgusal düşünce, duygu regülasyonu, otobiyografik hatırlama, anı fenomenolojisi, duygudurum, ruminasyon.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

"... every act of memory is to some degree an act of imagination."

Oliver Sacks

Autobiographical memory consists of events that define our self, our social relationships, and our environment (Berntsen, 1996; Brewer, 1986). While it contains information about a person's past life, it also continues to influence the present (Wilson & Ross, 2003) as well as the future (Szpunar, 2010). When people look into their past and actively evaluate their life experiences in the present, they generate ideas about how their past realities could be different. They start rewriting past events to create an alternative version of them (Roese, 1994). These alternative scenarios that we produce about our own experiences, including "what if" or "if only" sentences, are called *episodic counterfactual thinking* (De Brigard, 2014). They are thoughts describing what might or could have been if individuals acted different from their past experiences (e.g., "If I had put in a bit more effort in my studies, I would have been able to succeed in the class" or "If I had gone to the doctor on time, I would have started the treatment earlier") (Roese, 1994, 1997).

Episodic counterfactuals can modify our perception of past events and alter their meaning (Kray et.al, 2010). These mental simulations of alternatives to past events serve various functions in cognition such as, decision-making, preparing for future and emotion regulation (Morris & Moore, 2000; Page & Colby, 2003; Roese & Epstude, 2017). Previous studies have highlighted the importance of counterfactual thinking in regulating negative feelings by providing alternative perspectives on negative events (Sanna, 1999, 2001). However, they found controversial findings regarding its function (Blix et al., 2018). Our study aimed to examine the bidirectional relationship between mood and counterfactuals, focusing on the reappraisal function of counterfactuals in an emotional context.

1.1. Episodic Counterfactual Thinking

According to Tulving (1985), individuals do not only retrieve past events but also reconstruct them and project them into the future, which enables them to mentally time travel. The thoughts may also include what might be happening in the future, which represents the *episodic future thinking* (Szpunar, 2010). Recently, researchers found evidence for the underlying cognitive mechanism of episodic memory and future thinking. They stated that the same brain network, called the core brain network, activates when individuals engage in a retrieval process of their own experiences and reflect on the future based on their own experiences (Addis et al., 2009). In addition, researchers have stated that the *constructive episodic simulation hypothesis* advocating episodic details is the provenance for future representations and unique simulations to create novel stories by recombining these details (Schacter & Addis, 2007). To support the episodic simulation hypothesis, they have indicated that the prefrontal, posterior, and medial temporal lobes show similar activation patterns when individuals retrieve the past events and project themselves into the future. When they examined people with amnesia and other psychological illnesses, they discovered a resemblance between the deficit in episodic memory and future thinking (d'Argembeau et al., 2008; Gamboz et al., 2010). Such evidence on mental simulation is also important for counterfactual thinking as the same brain network is activated when individuals generate alternative scenarios of past events (Van Hoeck et al., 2013). More specifically, both simulations are the products of the mental images used by individuals to project themselves to the present and future based on episodic details; therefore, the regions involved in counterfactual and future thinking (i.e., the hippocampus and the parietal and temporal lobes) are activated in both types of simulation (Andrews-Hanna et al., 2010).

The formation of counterfactuals can vary depending on their valence, agent, and content. Firstly, individuals may modify the affective response of simulations, directing to either positive (upward) or negative (downward) outcomes regarding their valence. In upward counterfactual thinking, individuals can create counterfactual thoughts that are better than the actual events (e.g., "If I had started the treatment sooner, I would have recovered by now") (Epstude & Roese, 2008). In contrast, downward counterfactual

thoughts involve envisioning outcomes that are worse than the actual events. (e.g., “If I hadn't arrived on time, I would have missed the exam”) (McMullen et al., 1995). Researchers have proposed various mechanisms underlying the formation of upward vs. downward counterfactual thoughts. According to Epstude and Rose (2008), the consequences of actual events may be a fundamental source of the production of distinct counterfactual thoughts with respect to valence in individuals. When people encounter failures and negative experiences, they tend to produce better simulations than actual events (Markman et al., 1993). This alternative plot or action generation allows a failed or adverse event to have a favorable ending. Conversely, they tend to make worse alternatives than reality when they are successful or experience positive events (Markman et al., 1993). Unlike the previous case, there is a situation of producing an unsatisfactory ending for positive events by adding or subtracting different actions.

Secondly, counterfactuals may vary depending on the agent as the formation of counterfactuals is derived from altering an individual's actions. The reference point that refers to subject attribution, or agency, is the crucial factor determining the structure of counterfactuals (McMullen et al., 1995). For example, by producing a counterfactual simulation regarding the event, if the individual feels responsible and adjusts his/her behavior accordingly, this is called *self-referent counterfactual thoughts*. (e.g., “If I had not started studying on the last day, I would have been more successful”). On the other hand, counterfactual thoughts produced by altering the behavior of others, rather than the own behavior, are defined as *other-referent* (e.g., “If my mother had been calmer, we wouldn't have argued”). There is also a counterfactual type that includes general thoughts without attribution to any subject, known as *non-referent* (e.g., “If that were the case, everything could have been better”) (McMullen et al., 1995; Rye et al., 2008).

Thirdly, the content of counterfactuals can compromise additive, subtractive, and substitutional elements (Roese, 1994; Roese & Olson, 1995). Additive counterfactuals are created by adding new components to original stories (e.g., “If I had woken up earlier…”). Subtractive counterfactuals are created by extracting parts from the original story to produce alternative simulations (e.g., “If I hadn't followed my mom's

advice…"). Substitutional counterfactuals are created by replacing components with other components (e.g., "If I had joined to class rather than staying at home…"). It is possible to construct various counterfactuals by combining the subtypes of main alternatives. For example, one possible counterfactual may be produced by incorporating self-referent information and additional elements to the original event (Rye et al., 2008).

Episodic counterfactuals evoke a greater emotional response than hypothetical simulations as they are associated with an individual's narrative (Roese & Morrison, 2009). In other words, people tend to reflect on how their past choices and actions might have led to different outcomes. Thus, a distinction can be drawn between episodic counterfactuals and other forms of simulations (De Brigard, 2014). From this point of view, considering distinct types of episodic counterfactual in terms of their valence, agent or the content, it is essential to understand how these alternative scenarios function in human life. In addition to comprehending the functionality of counterfactual thoughts, it is also important to examine their phenomenological features, or how they are experienced subjectively. Researchers can gain a better understanding of how counterfactual thinking affects our emotions, behaviors, and psychological well-being by examining the subjective experience of these thoughts and their influence on functionality.

1.2. Phenomenology of Episodic Simulation

Autobiographical memory has been studied from different perspectives. Extensive investigation has been carried out on the phenomenological qualities of memories during recollection (Arditte Hall et al., 2018; Greenberg & Knowlton, 2014; Öner, 2021; Pillemer, 2009; D. C. Rubin et al., 2003). The phenomenological features are mainly: emotional intensity of the memory, reliving of the memory in the process of remembering, the ability to visualize the memory (i.e., imagery), and the valence of the memory (i.e., positivity), and sensory details (e.g., visual and auditory) (Rubin et al., 2003). These aforementioned features define memory experience and activate particular functions (Rasmussen & Berntsen, 2009). For example, recalling memories with

negative and high emotional intensity serves the directive function (Harris et al., 2014), which prepares individuals for similar events in the future. On the other hand, positive memories facilitate self-function to provide a coherent story and positive view of the person's identity (Alea et al., 2013; Taylor & Brown, 1988). The phenomenological features of the memories also provide insights into the individuals' psychological well-being and current mood (Wisco & Nolen-Hoeksema, 2010). For instance, previous research indicated that people with depression might remember memories with less specificity regarding the episodic details (Söderlund et al., 2014).

While there has been extensive evidence on the phenomenological features of episodic memory and how the phenomenology is linked with the memory functions, there are few studies on the phenomenological qualities of other simulations derived from episodic memory. Although the episodic memory and mental simulations, i.e., episodic future and counterfactual thinking, derived from past personal events are activated to a shared network, there are differences in their characteristics. For example, people tend to mentally stimulate future events more positively than memories recalled from the past (Grysman et al., 2015), supporting the positive bias towards the future (Taylor & Brown, 1988). Additionally, the possibilities imagined in the future have been rated as more important in people's lives (D'Argembeau & Van der Linden, 2012). Both these serve self-regulation as individuals maintain their hope for the future and feel better about themselves. Conversely, memories of the past represent actual events with events that include higher emotional intensity and sensory components than future and counterfactual thinking (D'Argembeau & Van der Linden, 2006).

While there are many comparative studies about the quality of past and future events, there is not much information about the characteristic of episodic counterfactuals compared to episodic memory and episodic future thinking. One line of research suggested that counterfactual thoughts might resemble episodic memory in terms of their phenomenology because episodic counterfactual thoughts are derived from past events (Özbek et al., 2017). On the contrary, another view suggested that counterfactual thinking could show phenomenological qualities like future projection since both are a simulation of thinking about an event that does not exist (Szpunar et al., 2014). The researchers also proposed differences between types of simulations. They suggested that

the level of flexibility in imagining future events is greater than in generating episodic counterfactuals (Van Hoeck et al., 2013). The hippocampus, responsible for recombining episodic details, shows greater activation during engagement in future thinking than reflecting on past events and generating counterfactuals (Addis et al., 2009). In contrast, there is no significant difference in hippocampus activation during counterfactual thinking compared to the recall of episodic memories.

According to De Brigard and Giovanello (2012), episodic memories have more sensory elements and coherent stories compared to spatial information than counterfactual and future thoughts. Nonetheless, when it comes to emotional intensity ratings for positive and negative events, both memories and future simulations reported higher than episodic counterfactual thoughts. Moreover, participants' beliefs regarding the likelihood of occurrence in simulations vary depending on the valence of event outcomes. Generally, the possibility of counterfactuals was lower than future thinking. Specifically, participants evaluated the possibility of counterfactuals with negative outcomes and future events with positive outcomes as less probable (De Brigard & Giovanello, 2012).

Another experiment by De Brigard et al. (2016) aimed to compare the variations between younger and older adults in terms of the phenomenological qualities of episodic memory, future thinking, and counterfactuals. Participants wrote an episodic memory in which they made a decision (i.e., choosing pasta or chicken for the wedding feast). Then, they were randomly assigned to a group where they would either generate counterfactuals, future thinking, or re-remember the event by using the event cues. They indicated that younger and older participants reported higher sensory, composition, i.e., level of specificity about time, location and day, and intensity for the reported memories than the counterfactual and future thoughts. They also noted that the episodic counterfactuals included more contextual details than episodic future thinking. They explained the findings focusing on the inherent nature of the reported events and argued as follows; episodic counterfactual thoughts can transfer more contextual information from episodic memory compared to other simulations, as they are a reality-derived simulation (Byrne, 2007). Specifically, episodic counterfactuals are more restricted by factual constraints than future thinking (Devitt & Schacter, 2018), which provides

evidence for the differing degrees of flexibility between these types of simulations (Van Hoeck et al., 2013).

With respect to internal components (i.e., episodic details), they found age differences, showing that elderly participants provided more external elements (i.e., semantic information) for episodic counterfactual and future thinking. The same result did not observe for memories. They suggested educational differences account for this pattern of findings relying on the evidence showing that as education level decreases, general knowledge, (i.e., semantic components) decreases. Overall, participants reported more internal components for episodic memory than other types of episodic reproduction. This is because the production of mental simulations involves recasting the original events and associated details. Therefore, counterfactual and future thinking are prone to adding or subtracting general knowledge into them, leading to a decline in internal details, i.e., episodic details. (Addis et al., 2008).

Ozbek et al. (2017) conducted a study where participants were requested to generate a significant event from their past (episodic memory), an important event that could have occurred but did not (episodic counterfactual thinking), and an envision future event (episodic future thinking). The participants were then asked to evaluate the phenomenological aspects of these reported events. They found that episodic memory is more specific than the other two types, includes detailed sensory and spatial information, and is more effortlessly recalled from a self-immersed viewpoint (e.g., visualizing the remembered event with one's own eyes). Consistent with previous research, individuals perceived the episodic future thoughts as more positive and significant for their life and identities (Berntsen & Bohn, 2010; Grysman et al., 2015). However, no positivity bias was found for episodic counterfactual thinking, which provides support for the difference in the phenomenology of counterfactuals and future thoughts. Another evidence showing the phenomenological distinction between future and counterfactual thinking comes from perceived plausibility of events via re-simulation. Simulating counterfactual thinking repeatedly decreases perceived plausibility, whereas simulating future thinking repeatedly increases perceived plausibility (De Brigard et al. 2013). They explain this result with the Norm Theory (Kahneman et al., 1986). According to theory, when we produce an alternative world

for the first time, there will be a little deviation from actual events. After repeatedly simulating episodic counterfactuals, individuals deviated from the reality more than the first; therefore, they are moving away from the normal or original representation. We see the opposite in future thinking because the original or normal representation of events does not constrain future thinking. Therefore, deviating from reality and true expression becomes meaningless here. Furthermore, the phenomenology of counterfactuals changes depending on re-simulation, as the ease of imagination, specificity, and valence increase with each simulation.

Current evidences about how distinct forms of counterfactual thoughts vary in phenomenology is limited. In a current research by Stanley and colleagues (2017), participants were asked to write down their positive and negative memories. After a week, they wrote both their upward and downward counterfactual thoughts for these memories. The findings revealed that the emotional intensity of different types of counterfactual thoughts varied depending on whether they were derived from the same or different valence of memory. Specifically, upward counterfactuals derived from positive memory and downward counterfactuals derived from negative memory were evaluated as having higher emotional intensity than the opposite directional simulation of counterfactuals, i.e., better simulation for negative memory and worse simulation for positive memory. The valence congruency between counterfactuals and memories determined the emotional intensity of counterfactuals.

1.3. Functions of Episodic Counterfactual Thinking

Individuals frequently use counterfactual thoughts as alternative versions of their experiences in daily life. Thus, it is reasonable to argue that these mental representations serve particular functions, regulating individuals' goals and concerns when they mentally time travel. In this section, while the findings on the functions of counterfactual thoughts are explained, findings on when counterfactuals become dysfunctional are discussed.

Regardless of the type of counterfactual thoughts, the common function is to provide meaning to the lives of individuals by reinterpreting past events by comparing how they

happened and how they could have been (Kray et al., 2010). The primary motivation to give meaning to past experiences is to provide a coherent narrative to life stories (Roese & Olson, 2014). As mentioned in previous sections, counterfactual thinking has two subtypes regarding its directionality. People can form an alternative scenario of the past using a more positive simulation (upward counterfactual thoughts) or a more negative simulation (downward counterfactual thoughts). Epstude and Roese (2008) argued that the mechanism that stimulates upward and downward counterfactual thinking is different from each other. On the one hand, when people encounter failures, they tend to produce better simulation than actual events (i.e., upward counterfactual thinking); on the other hand, they tend to produce worse alternatives than reality when they succeed (i.e., downward counterfactual thinking) (Markman et al., 1993). Roese (1997) explained this distinction" with the *contrast effect*, suggesting that the emotional consequence of an event triggers the production of counterfactual thinking in the opposite direction. More specifically, individuals tend to produce a better alternative simulation if the result is below expectations eliciting negative emotion. The opposite pattern is observed for downward counterfactuals; in that, individuals often think about scenarios that could have been harmful with the effect of contrast after a favorable event instead of deducting the upbeat version of this event. From this point of view, functional theory advocates upward and downward counterfactual thoughts that can serve distinct functions for individuals (Roese, 1994, 1997).

Thinking better alternatives than reality after inefficacy makes a preliminary preparation for similar future events (Morris & Moore, 2000) that may occur by increasing the behavioral intention (Epstude & Roese, 2008) and sustaining future decisions (Page & Colby, 2003) . For example, students often do not study well because they postpone studying for the exam until the last night. Therefore, after failing the test, they create alternative thoughts by saying "If I had more time to study for the exam, I could have passed the course." Here, the student specifies a behavioral intention for similar situations that may occur by constructing counterfactuals to avert the reappearance of similar events (Gavanski & Wells, 1989). Then the next time the student takes this exam, s/he will start studying earlier to pass.

Preparing for future similar situations helps to comprehend past mistakes and discourage harmful consequences by considering advantageous future actions (Roese & Epstude, 2017). For example, after playing certain games such as anagram, individuals produced upward counterfactual thinking to obtain a more satisfactory conclusion in the future by increasing their behavioral intentions (Markman et al., 2008). They could not find any relation between future intention increment to acquire better results among those who created downwards and those who did not produce counterfactuals. In an earlier study, Roese (1994) showed that individuals who wrote upward counterfactuals indicated more future goals for their academic life compared to the ones writing downward counterfactuals. Counterfactuals serve a directive function in that they inform the decision process and prepare individuals for the future (Byrne, 2016; Epstude & Roese, 2008). This is mainly because the gap between the actual and the better reality triggers negative emotions when people think upward (Epstude & Roese, 2011) and thinking of better alternatives increases the feeling of regret in an individual (Howlett & Paulus, 2013). Unchosen alternative paths are remembered, triggering the sense of regret, because, it becomes more salient that if a different way were chosen, there would be a better outcome (Epstude & Roese, 2011).

Markmann et al. (2008) argued that negative emotions like regret derived from producing upward counterfactuals are associated with increased future preparedness and goal setting. This is functional in the sense that especially upward counterfactuals guide future plans considering alternative choices for the possible similar events (Camille et al., 2004; Zeelenberg, 1999). On the other hand, one line of research proposed that upward counterfactual thoughts might be dysfunctional in eliciting negative emotions, which might affect well-being (Epstude & Roese, 2008). Broomhall et al. (2017) meta-analysis explained the factors acting as moderators that affect the link between depression and upward counterfactual thinking. The study found that the feeling of regret is a crucial factor that affects this relationship (Broomhall & Phillips, 2018). Seta et.al (2008) argued that individuals feel regret when they recognize the other options for their situations by having upward counterfactual thoughts because individuals not only think about better situations but also compare them with reality, the vast gap between them can increase the feeling of regret. Upward counterfactual thinking increases self-

accusation with the effect of regret eliciting (Branscombe et al., 2003), which triggers depressive symptoms (Phelan et al., 2013). In addition, augmented stress results from regret and upward counterfactual thoughts, negatively impacting depression (Callendar et.al, 2007). Gilbar and Hevroni (2007) examined the association between psychological stress and the frequency of generating counterfactual thoughts in a sample of 200 individuals diagnosed with breast cancer. They utilized *the Counterfactual Thinking Self-Report Questionnaire* to assess this relationship**.** According to the results, people who produced high upward counterfactual thoughts reported high stress. They did not reveal any link between downward counterfactual thinking and psychological stress. Some studies explain not only depression but also the relationship of counterfactual thoughts with anxiety and PTSD (El-Leithy et al., 2006). Callander et al. (2007) measured anxiety, stress, and counterfactual thoughts using a thought-listing task to examine 62 women with recurrent miscarriage traumatic experiences. According to the result, upward counterfactuals was found to be positively associated with anxiety. Specifically, individuals who often produce upward counterfactual thoughts experience high miscarriage-related anxiety. While producing upward counterfactuals, individuals are also in a loop which indicates the production of a better alternative for an adverse event through the contrast effect intensifies the negative emotion of individuals, increasing psychological problems (Feng et al., 2015). It is noteworthy that some specific circumstances affect the production of upward counterfactuals, and thus the relationship between its mental health. The event's content is an essential factor that affects the thoughts about the event (Broomhall et al., 2017). According to the norm theory of Kahneman and Miller (1986), individuals lean toward constructing counterfactual thoughts to normalize the exceptional consequences of an unusual event, achieving an acceptable level for the event. Traumatic experiences, which are extraordinary events in individual life, cause more counterfactual production than ordinary events, provoking traumatic stress reactions (Davis et al., 1995). Even if the content of the event is not as severe as losing a loved one, individuals can also construct upward counterfactual thoughts for non-traumatic unfavorable events such as course failure (Markman et al., 2006). However, as a result, they may not experience stress such as upward thoughts produced from the traumatic event, so the event's content can influence the relationship between upward counterfactual thinking and

stress. Another factor affecting this relationship is the perceived control over the event (Markman et al., 1995). When individuals think about a specific event, if they believe that they can control their behavior in that event, they are more willing to change the outcome by producing counterfactuals compared to events that seem uncontrollable to individuals. Markmann (1995) explains this relationship with the *controllability hypothesis,* indicating a positive relationship between perceived control and mutability of events as they increase, counterfactual production increases. In addition, perceived control is the variable that regulates the relationship between counterfactual thoughts and affective responses. Someone who generates upward counterfactual thought may feel less negative about the event if he feels high in control because he has a possibility to repair it next time. However, if he does not feel in control, he will feel averse if he generates upward counterfactual thoughts on the event due to helplessness.

It is comparatively simpler to come up with a positive substitute for an unpleasant experience, than to generate a negative alternative for a pleasant experience (Kahneman & Miller, 1986). They found that it is harder to imagine a happy conclusion turning worse than an unfavorable situation turning better because of the ease of imagining a positive story. Thus, downward counterfactuals are more demanding for individuals than upward counterfactuals (McMullen et al., 1995). However, regarding the functions, Roese (1997) argued that deriving an alternative scenario worse than reality increases satisfaction and relief due to comprehending the current situation more favorable than the worse condition.

Kennedy et al. (2021) argued that the distinct types of counterfactuals could be related to psychological symptoms after death of a significant person. They found that psychological distress and prolonged grief are related to upward counterfactual thoughts while downward counterfactual thoughts are related to post-traumatic growth, which the latter helps cope with emotional pain of a missing loved one (Kennedy et al., 2021). Most of the studies on the downward counterfactual emphasize such an emotion regulation function (Gilbar & Hevroni, 2007; White & Lehman, 2005). The regulatory function of downward counterfactual thinking has been shown in victims of sexual assault as well. When the victims engage in upward counterfactual thinking, they experience more stress. However, when they generated downward counterfactual

thoughts they felt less stress about their assault (Barnett & Maciel, 2021). Teigen and Jensen (2010) conducted a similar study with tsunami victims supporting previous findings. They demonstrated that victims who produced worse alternatives about the tsunami considered themselves lucky survivors than victims who produced better alternatives about the event, indicating the self-regulatory role of downward counterfactual thinking (Teigen & Jensen, 2011).

There are findings in the literature that downward counterfactual thinking may also be dysfunctional like upward counterfactual thinking (Roese & Olson, 2017). Despite the positive relation of downward counterfactual thoughts with post-traumatic growth (Kennedy et al., 2021), there are studies that suggest a link between such thoughts and post-traumatic stress reactions (Blix et al., 2016). Blix et. al. (2018) investigated that how vividness and frequency of counterfactual thoughts were connected to post-traumatic stress reactions in two groups of people who had experienced different types of trauma - those who survived the fire on the ferry Scandinavian Star in 1990, and those who lost loved ones in the same incident. The researchers discovered that survivors exhibited a higher prevalence of downward counterfactual thoughts compared to the bereaved, whereas the bereaved demonstrated a greater occurrence of upward counterfactual thoughts than the survivors did. Consequently, they proposed that the bereaved primarily engaged in thoughts about how circumstances could have been improved, as they had witnessed the worst possible outcome. In contrast, survivors, were not only victims of the tragedy, but also fortunate to have survived. This meant that they had encountered a certain degree of proximity to unfavorable outcomes, which triggered downward counterfactual thoughts for seeking relief. (Roese & Epstude, 2017; Teigen & Jensen, 2011). Additionally, they found that the vividness and recurrence of both types of thoughts were linked to post-traumatic stress reactions. It was argued that counterfactual thoughts can be just as distressing as actual memories of a traumatic event and can have comparable impact on traumatic stress. Kennedy et al. (2021) explained this within the mnemonic framework of PTSD. Rubin (2008) suggested that the memory of traumatic events and the thoughts in the aftermath, rather than the event itself, determine the extent of trauma-related psychological problems. Thus, vividly produced downward counterfactual thoughts may prevent adaptive recovery from the

trauma and can further trigger posttraumatic stress reactions. (Blix et al., 2018). Therefore, it could be beneficial to investigate the link between quality of counterfactual thoughts and functionality of them.

1.4. The Effect of Emotional States on Counterfactual Thinking

The concept of "feeling as an information theory" advocates the importance of personal experiences, including emotions, moods, and physical perceptions for individuals' decisions (Schwarz, 2012). According to the theory, emotions are the origin of knowledge that directs individuals' motivations, behaviors, attitudes, cognitions, and impressions (Schwarz & Bohner, 1996). Based on this theory, the emotional state of people provides a reference point influencing the content and direction of counterfactual thinking. According to Schwarz (1990), negative and positive emotions have a distinct influence on the counterfactual thoughts activated. Negative emotions carry the message that the situation is disturbing or inadequate, which triggers upward counterfactual thinking to compensate for the unfavorable feelings. On the other hand, positive emotions signal that circumstances are satisfactory thus, counterfactual thinking tends to downward strengthen the positive emotional state with increasing relief and satisfaction (Roese & Olson, 1997). Supporting evidence has shown that when individuals produced counterfactual thoughts for imaginary scenarios under negative and positive mood states, participants in the positive mood condition generated a greater number of downward counterfactuals, whereas those in the negative mood condition generated a higher quantity of upward counterfactuals (Sanna et al., 2001).The results were explained from the perspective of motivational functions. More specifically, the influence of mood on self-motivation might be mediated by the presence of counterfactual thoughts. Upward counterfactual thoughts, provoked by negative feeling can prepare individuals for alternative future scenarios and support self-improvement while downward counterfactual, produced by positive mood, may serve to maintain positive mood and provide self-enhancement (Sanna, Chang, et al., 2001). Similarly, in two studies Sanna et al. (1999) examined the influence of mood on the direction of counterfactuals. In the first study, they presented participants with hypothetical scenarios composing the first date and interviewing for a job. In the second

study, they requested real-life incidents that occurred within a year and asked participants to construct counterfactuals. Findings from both studies showed that, both for their own life stories and hypothetical scenarios, participants experiencing a positive mood exhibited a higher tendency to generate downward counterfactuals, whereas individuals in a negative mood displayed an increased inclination towards producing upward counterfactual thoughts. (Sanna et al., 1999). Also, when they examined the latency to construct the counterfactuals, they found an interaction between mood and counterfactuals, indicating that those in positive moods agreed with the downward counterfactual statement faster than the upward; on the other hand, those in negative moods agreed to upward counterfactual statements faster than the opposite. The effect of emotional intensity also influenced the relationship between mood and counterfactuals. More specifically, the experience of upward counterfactuals was more intense in negative moods; however, downward counterfactuals were more intense in positive (Sanna & Turley-Ames, 2000).

The literature contains limited empirical research investigating how mood and counterfactual thinking are related. However, the existing research suggests that mood has a substantial influence on the content and direction of counterfactual thoughts. Specifically, people tend to generate distinct types of counterfactual thinking depending on their current emotional state. However, some studies suggested that the relationship between mood and counterfactual thinking is bidirectional. Scholars have explored the impact of generating such thoughts on our emotional states, although this line of inquiry has been relatively restricted (Roese & Olson, 1997). In the following section, we will provide further information on how counterfactual thoughts can elicit emotional responses.

1.5. The Reappraisal Function of Episodic Counterfactual Thinking

Transactional theory of stress and coping (TTSC) claimed that the way individuals experience stress depends on the transaction between an individual containing her psychological, cognitive, and affective conditions and her environment (Lazarus & Folkman, 1984). The perception of the stressor as threatening to the individual is

determined by various factors variables, including personal and contextual dimensions such as abilities, cognition, aptitudes, and rules. Lazarus (1966) gives precedence to the reappraisal of stressors to comprehend the effect of stress on individuals. The way individuals cope with stress depends on how an individual appraises the stressful condition. Reappraisals can be different depending on their precedence. Primary reappraisal informs whether a stressor produces danger for an individual. If the individual perceives the stressful situation as a threat, the secondary reappraisal is activated by which individuals judge the sufficiency of resources and coping strategies to overcome the negative condition (Folkman et al., 1986). Regarding the counterfactuals, Gleicher et al. (2014) argued that counterfactual thinking influences both the primary and secondary reappraisal. Upward counterfactual thinking affects the primary reappraisal by perceiving the stressful situation as a real threat to the psychological and physical well-being of the self. Production of better scenarios decreases the satisfaction of the actual situation, resulting in the individual to see the events threatening. However, downward counterfactual thinking underscores the risk of actual events by considering the worse alternative than reality, increasing satisfaction with the present condition (Gleicher et al., 2014).

Folkman and Lazarus (1980) argued that when individuals search for coping strategies after secondary appraisal, they might utilize problem-focused and emotion-focused coping. If the individuals believe that they have enough resources to manage the threatening event, they adopt to use problem-focused coping, in which they analyze the problem and develop plans and actions on how to solve it. On the other hand, if individuals assume that the resources are insufficient, they tend to emotion-focused coping in which they directly target the emotions through strategies like rumination, avoidance or reappraisal (Lazarus & Folkman, 1984). From this point of view, researchers advocated that the use of counterfactuals might influence the coping mechanism. Upward counterfactual thinking can activate problem-focused management as individuals think about better simulations, gain a sense of agency over the situation, and plan better efforts for similar conditions. On the other hand, through downward counterfactual thinking, individuals think about worse simulations, develop a more

positive perspective toward the actual event and feel content, which may be helpful, especially for emotion-focused coping (Kasimatis & Wells, 1995).
Rye et al. (2008) examined the relation between coping mechanisms and various counterfactuals and supporting the link between counterfactuals and coping, they showed that all forms of counterfactual thoughts were related to adaptive coping skills while particularly downward counterfactuals was linked with positive reappraisal, apprehending the favorable aspects of the event.

After an adverse experience, it is more effortful to generate worse outcomes to negative events, however as individuals distance themselves and elaborate on the circumstances through downward counterfactual thoughts, they gradually reappraise the event and the alternative perspectives serve to repair the negative mood (McMullen et al., 1995). More specifically, findings prove that downward is associated with post-traumatic growth (Kennedy et al.,2021). The relationship between traumatic growth and downward counterfactual thoughts depends on how individuals reconcile with actual events in the long term through creating worse alternatives.

When considering the affective responses that arise from engaging in counterfactual thinking, the Reflection and Evaluation Model (REM) stated that there are two different cognitive process (Markman & McMullen, 2003). One way of thinking is evaluative, where we make comparisons between actual events and hypothetical alternatives. As a result of evaluation, affective contrast appears in which individuals feel differently about the situation depending on whether the alternative situation presents a more favorable or unfavorable results than the actual event. When we think about upward counterfactuals, where the imagined scenario is better than what actually happened, we often feel negative emotions. This is because the gap between the actual and imagined events highlights the possibility of a more desirable outcome that we did not achieve. On the other hand, when we think about downward counterfactuals, where the imagined scenario is worse than what actually happened, we tend to feel positive emotions. This is because we feel satisfied with the current situation compared to the imagined worse scenario. The second thinking style is reflection, in which individuals focus solely on the possibility of counterfactuals without considering the contingencies of the actual event. As a result of reflection, affective assimilations appear in which a mood

congruence effect occurs. Specifically, individuals tend to feel better after better simulations, but worse after worse simulations. Markmann and McMullen (2003) elucidated this phenomenon in terms of attentional focus, proposing that when individuals direct their attention towards counterfactual possibilities, it leads to affective assimilation. On the other hand, when the focus is on the event itself, the affective contrast effect is more likely. Accordingly, distinct emotional reactions occur after producing counterfactuals depending on individual mindsets.

1.6. Exploring the Role of Individual Differences in Generating Counterfactuals

There could be several factors underlying the individual differences in the content and the phenomenology of the counterfactuals. Rumination which refers to individuals' repetitive negative thinking over events has been considered similar to the counterfactual thinking as both involve extensive post-event elaboration (Kahneman, 2014; Mitchell et al., 2016). Roese et.al. (2009) indicated that individuals who engage in repetitive thinking experienced an increased relationship between regret derived from counterfactuals and depression. However, counterfactual thinking is not the same as being stuck in the past, individuals construct alternative simulations adding or subtracting new elements, which is more difficult in rumination as it is less flexible than counterfactual thinking (Kircanski et al., 2012). Also, when used with a positive perspective, counterfactuals may reappraisal and serve to the resolution of the event. On the other hand, There are two types of rumination (Schoofs et al., 2010); Brooding involves a salient negative bias, resulting in the recall of negative memories which have reduced specificity lacking particular event details. In that sense, while the negativity bias may be related to the production of particularly upward counterfactuals, less specific information may lead to overlook past events (Finnbogadóttir & Thomsen, 2013). On the other hand, reflective rumination involves stepping back from the past by which individuals elaborate the event with a nonemotional focus from different perspectives. In that sense, reflection could be considered more flexible, serving individuals to gain insight over past events. However, this flexibility may lead to counterfactual thinking in both upward and downward directions (Guajardo et al., 2009).

The second factor to consider is religiosity. Based on this point of view, Kasimatis and Well (1995) argued that believers who think they deserve the consequence of events that happened to them would not produce counterfactuals compared to nonbelievers. This could be related to a fatalistic viewpoint, in which individuals accept the consequences of events without considering alternative outcomes. They also found a negative association between upward counterfactual thinking and religious coping strategy, which means individuals praying to God or religion in threatening events are less likely to produce better alternatives than the actual outcome (Kasimatis & Wells, 1995). Alternatively, they may use downward counterfactuals, imagining worse alternatives for actual events as a way of expressing gratitude that things are not worse. Therefore, there may be a complex relationship between religiosity and counterfactual thinking.

The production of counterfactuals might be related to emotion regulation skills of individuals, as counterfactual thinking might be used as a coping mechanism to regulate emotions when confronted with adverse life experiences (Roese, 1994; Roese & Olson, 2014). Specifically, counterfactual thinking serves as a tool for reappraising a situation by imagining how it could have been different, which can help to reduce negative emotional reactions such as regret, disappointment, and anger (Gleicher et al., 2014). Individuals' capacity to manage their emotions can significantly influence the function of counterfactual thinking as a tool for emotion regulation. For example, individuals who have strong emotion regulation skills can engage in adaptive forms of counterfactual thinking, such as using counterfactuals as a source of motivation to change emotional states and improve possible future outcomes. On the other hand, individuals with poor emotion regulation skills may engage maladaptive forms of counterfactuals, such as ruminating negative past events and generating counterfactuals to maintain negative emotions, leading to feelings of hopelessness for the future. From these perspectives, it could be beneficial to control individuals' emotion regulation skills to better comprehend their facilitative or inhibitory effects on the function of counterfactuals.

In summary, in this study, individuals' rumination, religiosity, and emotion regulation skills are controlled as individual differences.

1.7. Present Study

In the present study, the primary aim is to test the impact of distinct episodic counterfactuals (upward vs. downward) in the regulation of negative emotions. Previous research provided controversial findings for the mood regulation function of the counterfactuals. Remembering negative events increases negative feelings; however, counterfactual thinking may serve the regulation of these negative emotions as they provide alternative perspectives for the event (Mullen et al., 1995). Second, we aim to investigate whether the functions of the counterfactuals may be supported through positive mood induction which may change the emotional context and make positive representations more available for the individual. Previous studies on how mood and counterfactual thinking are related have been limited (Sanna,1999). Most of these studies have focused on examining the effect of one variable on the other in a one-way direction (Roese, 1994). In contrast, our study aims to investigate the bidirectional relationship between mood and counterfactuals, with a particular emphasis on the reappraisal function of counterfactuals in an emotional context. To accomplish this, we experimentally manipulated the emotional context and explored how this impacts use of counterfactual thinking as a coping mechanism.

Third, we aimed to investigate whether the phenomenology of the counterfactuals influence their ability to regulate emotions. This is particularly important because although there are many studies in memory phenomenology (Luchetti & Sutin, 2018; Rubin & Siegler, 2004), few studies examined the phenomenology of counterfactual thoughts and their role in the change in emotional states (Sanna & Turley-Ames, 2000). Additionally, few studies have explored the impact of counterfactual thoughts' phenomenology on post-traumatic stress reactions in the field of trauma (Blix et.al. 2016, 2018), and these studies have typically focused on major incidents. In our research, we aim to examine the phenomenology of counterfactual thoughts that arise from episodic memories with more interpersonal problems.

Accordingly, participants were prompted to recollect a negative memory involving an interpersonal event and rate the phenomenological features associated with the recollection. Afterwards, the participants were divided into two separate groups. One group of participants induced positive mood before the counterfactual thinking to examine whether positive mood supports the regulatory function of counterfactuals, while the other group served as a control condition, being presented with a video that did not evoke any emotion. After the videos, all participants were requested to produce upward or downward counterfactual thoughts associated with this event. The participants' moods were measured three times during the study: after recalling the negative memory, after watching the video, and after generating the counterfactual thoughts,

Lazarus' (1966) theoretical framework highlights the significance of cognitive reappraisal in understanding how stress impacts individuals. This means that the way people cope with stress is dependent on how they interpret the stressful situation. Additionally, producing counterfactual thoughts is a form of recasting the original events, which can serve as a reappraisal process. Drawing on these perspectives, we hypothesized that episodic counterfactual thinking will serve as a coping mechanism for regulating negative emotions after recalling negative memories. Specifically, we predict that individuals who create downward counterfactual thinking will report lower degree of negative affect compared to those who produce upward counterfactuals. This is because downward counterfactuals may increase satisfaction with past experiences by considering worse alternatives, leading to an emotion-focused strategy (Roese & Epstude, 2017).

Second, our study predicted that positive mood induction would enhance the emotion regulation function of counterfactual thinking. Specifically, we hypothesized that participants who experience mood enhancement will demonstrate greater use of counterfactual thinking as a coping mechanism for regulating negative emotions compared to those who do not experience enhanced mood. Additionally, we predicted that there would be an interaction effect between mood groups (mood enhancement vs. control) and counterfactual types (upward vs. downward) on the regulation of negative emotions. Specifically, we predict that participants in the enhanced mood group who wrote downward counterfactuals will report the greatest reduction in negative emotions compared to participants in the other three conditions (enhanced mood with upward

counterfactual, control group with upward counterfactual, and control group with downward counterfactual). Conversely, we predicted that participants in the control group who generate upward counterfactual thoughts would report the least reduction in negative emotions compared to participants in the other three conditions. These results would offer additional evidence to support the role of counterfactual thinking in regulating emotions, emphasizing the significance of accounting for individual variations in mood states when evaluating the efficacy of various forms of counterfactual thinking.

Third, the differences between the phenomenology of various counterfactuals in an emotional context were explored, as there is a lack of information about how emotional context affects the phenomenology of counterfactuals. On the other hand, there is only one existing study on how the phenomenology of counterfactual thoughts affects the relationship between mood and such thoughts. Accordingly, the emotional intensity of counterfactuals was found to have a significant influence on the relationship between mood and counterfactual thoughts. In particular, upward counterfactual thoughts were experienced more intensely in negative moods, whereas downward counterfactual thoughts were more intense in positive moods (Sanna & Turley-Ames, 2000).

Lastly, limited research has shown a relationship between individual differences and counterfactuals (Davis et al., 1995; Kasimatis & Wells, 1995; Sanna, 1998). We performed an exploratory investigation to explore how rumination, emotion regulation skills, and religiosity shape the relationship between mood and counterfactual thinking.

2. METHOD

2.1. Participants.

The initial sample for this study comprised 120 participants, but six individuals who did not complete the study were excluded from the analysis. The final sample included 114 participants, consisting of graduate and undergraduate students from Kadir Has University as well as individuals recruited through social media using the convenience sampling. Of these participants, 91 were female (M = 22.80, SD =2.46) and 23 were male (M = 23.67, SD = 2.67) with ages ranging from 19 to 30 years (M = 22.96, SD = 2.51). All participants completed the study measures on Qualtrics. Additionally, participants were randomly assigned to either a positive mood or control condition, as well as to an upward or downward counterfactual thinking condition.

2.2. Autobiographical Memory Recall. Participants were asked to remember a negative autobiographical memory involving interpersonal experience. We took memory instruction from Ayduk and Kross's (2010) study, and participants read the following memory recall prompt:

> *"Think of a recent time when you felt rejected by someone who meant a lot to you. Perhaps you were looking to them for affection, for recognition, or for understanding or sympathy. This person turned away and cast you off as if they did not value you at all. Please try to recall one event specifically that is relatively recent and unresolved and still highly upsetting to you. Take your time as you try to do this."*

After participants reported their memories, they rated those memories on a number of phenomenological questions (see 2.2.5 Phenomenology Questions).

2.3. Mood Manipulation. Participants were assigned to two groups, which are enhancement and control groups. A short 2-minute video clip was shown to both groups. In order to induce positive emotions, we used a section from The Jungle Book, an animated movie in the mood enhancement group. In this clip, Baloo, the bear, sings a

song called 'The Bare Necessities, and the little boy, Mowgli, dances with him. This video clip has also been used in previous studies to induce a positive mood (Beukeboom & Semin, 2005). For the control group, a video was selected from The Open Library for Affective Videos (OpenLAV). A woman teaches how to knit by proceeding gradually in the video.

2.4. Episodic Counterfactual Thoughts

After watching the videos, participants were requested to write their counterfactual thoughts about their memories. Two forms of instructions were adapted from Sanna et al. (1999) to request upward (better simulation) vs. downward (worse simulation) counterfactual thinking. (See Appendix B for Turkish instructions).

The instruction for the upward condition was as follows:

> *"When people experience negative situations, they have thoughts like "if only" or "what if" in their minds and construct alternative scenarios about how the event could have turned out more positively. For example, after failing an exam, a student might think, "If I had been studying well, I might not have failed the exam."*
>
> *"Now think about the memory that you just wrote. In the spaces below, please list sentences beginning with "If that is the case..." that would have made the outcome of this event better than the actual event (Please list at least three items.)"*

The instruction for the downward condition was as follows:

> *"When people experience negative situations, they have thoughts like "if only" or "what if" in their minds and construct alternative scenarios about how the event could have turned out more negatively. For example, after an exam, a student might think, "I could have failed the exam if I had not been studying well."*
>
> *"Now think about the memory that you just wrote. In the spaces below, please list sentences beginning with "If that was the case..." that would have made the*

outcome of this event worse than the actual event (Please list at least three items.)"

2.5. Mood measures. Participants rated mood questionnaires three times within the study: after the writing memory, after the watching videos, and after the writing counterfactuals. They were requested to rate "How they feel right now" and "How intense this feeling is." They reported their mood on 5 points Likert scale (1: very negative; 5: very positive).

2.6. Phenomenology Questions. The Autobiographical Memory Questionnaire is a scale developed by Rubin, Schrauf, and Greenberg (2003), and it assesses the phenomenological features of autobiographical memories on a 7-point Likert scale. Individuals rated the emotional intensity, reliving, visual imagery, and the emotional valence (-3 = very negative, +3 = very positive) (see Appendix C).

Participants rated the items both for the reported negative memories and the counterfactual thoughts associated with the reported event. The memory phenomenology questions modified by the Ozbek et al. (2017) to be used with episodic counterfactual events. In the original scale, "As I remember the event" was replaced with "As I imagine the event" to ask the phenomenology of episodic counterfactual thoughts. For example, the reliving question was modified like that; "As I imagine the event, I feel as though I am experiencing the event now" (1 = not at all, 7= as clearly as if it were happening now) (see Appendix C).

2.7. Ruminative Response Scale (Short Version). The original Ruminative Response Scale consists of a 22 item scale developed by Nolen-Hoeksema and Morrow (1991). Treynor et al. (2003) modified the scale and removed depression-related items and focused on the 10-items addressing particularly the repetitive negative thoughts. The revised version has two subscales, namely brooding and reflection, each of which involves five items. The sample item for the reflection subscale is "Write down what you are thinking and analyze it", and for the brooding subscale, it is ``Think, Why can't I handle things better?"(Appendix D).The initial version of the Ruminative Response

Scale- short form has good internal consistency reliability for brooding subscale (Cronbach α = .77) and for reflection subscale (Cronbach α = .72) (Treynor et al., 2003). While reflection is related to depressive symptoms and evaluates the problem-solving skills and introspection of the person, brooding, on the other hand, measures focusing on negative situations that may be encountered during the solving phase of problems. There is no reverse coded item in the scale. The scores marked on the scale are summed and the ruminative levels of the individuals are calculated. Accordingly, high scores indicate a high degree of rumination.

Erdur-Baker and Bugay (2012) conducted the Turkish adaptation of the scale, and the internal consistency of the short version was found to be α = .75 for brooding and α = .77 for reflection.

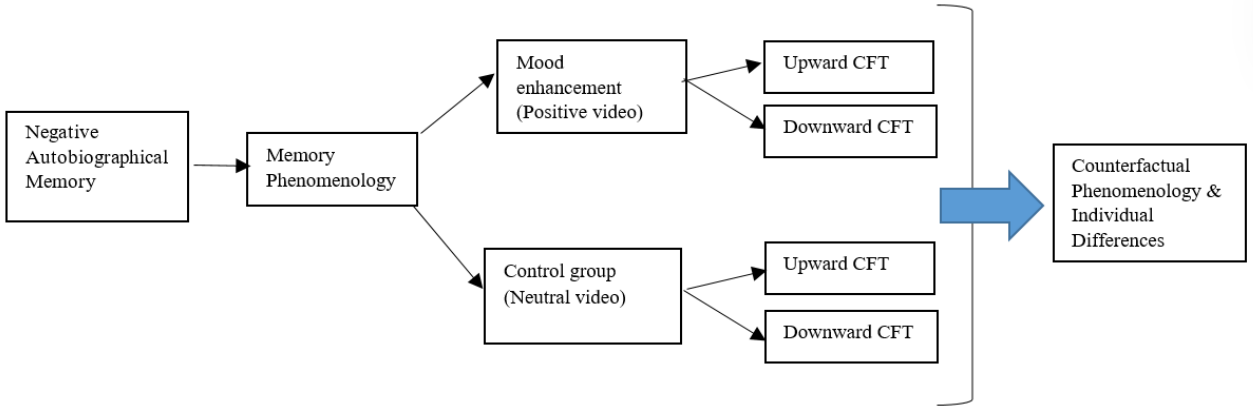
2.8. Emotion Regulation Questionnaire (ERQ). The ERQ (Gross & John, 2003) measures how individuals employ two different approaches to manage their emotions: cognitive reappraisal and suppression. It consists of a set of 10 items, where participants rate their agreement on a 7-point scale. The cognitive reappraisal subscale assesses individuals' involvement in the re-evaluation process of the emotional event to construe the situation and change the mental interpretation of the emotion accompanying the event. On the other hand, the expressive suppression subscale measures individuals' tendency to inhibit emotional expression when managing their emotions. There are no reverse questions, and higher scores demonstrate how often individuals resort to reappraisal and suppression strategies to regulate their emotions. Yurtsever (2008) conducted the Turkish adaptation of the scale. The internal consistency of the scale was assessed, resulting in Cronbach's alpha coefficients of .85 for reappraisal and .78 for suppression. (see Appendix E).

2.9. Religiosity Scale. Peterson and Seligman (2004) developed a scale to assess the general religiosity of individuals. There are ten items (e.g., I believe in universal power or a god), and adopts a 7-point Likert scale, ranging from 1 (completely disagree) to 7 (completely agree). Demir and Kumkale (2013) translated the scale into Turkish, and they found Cronbach's Alpha to be .90. The scale was provided in Appendix F.

2.3. Procedure

Participants completed the study via Qualtrics (www.qualtrics.com). Initially, they were requested to recall a recent negative autobiographical memory involving rejection and lack of empathy that had upset them. Participants then answered questions about the memory's phenomenology, including valence, emotional intensity, imagery, and reliving of memories. Baseline mood was measured during this first stage. In the second stage, participants were randomly assigned to mood groups. The mood enhancement group received positive mood induction, while the other group did not receive any mood induction. Mood was measured to assess the effectiveness of the manipulation. In the third stage, participants were randomly assigned to upward and downward conditions, resulting in four conditions: (1) upward and (2) downward in the mood enhancement group, and (3) upward and (4) downward in the control group. Participants in the upward and downward conditions were instructed to imagine better or worse simulations of the memories they had just recalled, depending on their assigned condition. After writing their counterfactual thoughts, they rated the phenomenology questions again, and their mood was measured. Finally, participants completed the Ruminative Response Scale, the Emotion Regulation Questionnaire (ERQ), and the Religiosity Scale.

Figure 2. 1. Depicting the Stages of Research



2.4. Data Analysis Procedure

First, to evaluate the effectiveness of positive mood induction, a two-way mixed design ANOVA was conducted to assess mood at three different time points: Time1 (after writing autobiographical memory), Time2 (after watching videos), and Time3 (after counterfactuals). Next, a three-way mixed ANOVA was conducted to test the first and second hypotheses regarding the role of counterfactual thinking in mood regulation and the effect of positive mood on counterfactual thinking. Mood enhancement (positive vs. neutral) and counterfactual types (upward vs. downward) were used as between-subject variables in this analysis. Only mood reports from Time2 (after watching videos) and Time3 (after writing counterfactuals) were included. This is because results from the previous analysis indicated no significant difference between Time1 (after writing autobiographical memory) and Time3 (after writing counterfactuals) in moods, suggesting that participants' moods returned to their baseline levels after engaging in counterfactual thinking. This finding suggests that counterfactual thinking served as a solid reminder of the recalled memory, which will be discussed in detail later.

In the third analysis, we aimed to investigate the role of counterfactual phenomenology. To accomplish this, three separate three-way ANCOVAs were conducted. These analyses were conducted to examine the effects of mood enhancement and

counterfactual types on mood change while also considering the influence of counterfactual phenomenology as a controlling factor. Furthermore, a hierarchical regression analysis was performed to gain a deeper understanding of the role played by counterfactual phenomenology and individual differences in predicting mood outcomes. This analysis allowed us to explore the extent to which the phenomenological aspects of counterfactual thinking and individual characteristics contribute to the variability in mood response.

3. RESULTS

3.1. Preliminary Analysis: Bivariate Relations among the Variables

A bivariate correlation analysis was conducted to explore the relationship between the phenomenological characteristics of memory and counterfactuals, and their relations with individual differences, i.e., rumination, religiosity and emotion regulation. While we found significant relationships between the phenomenological features of memories and counterfactual thoughts, no significant association was observed regarding individual variations. Memory valence was positively correlated with counterfactual valence, $r(114) = .36$, $p<.01$, but negatively correlated with emotional intensity $r(114) = -.33$, $p<.01$, reliving, $r(114) = -.25$, $p<.01$, and imagery of counterfactuals, $r(114) = -.25$, $p<.01$. Emotional intensity of memory was positively correlated with emotional intensity, $r(114) = .55$, $p<.01$, reliving , $r(114) = .54$, $p<.01$, and imagery of counterfactuals $r(114) = .49$, $p<.01$, but it did not correlate with counterfactual valence. The degree of reliving the past was positively correlated with emotional intensity $r(114) = .34$, $p<.01$, reliving, $r(114) = .40$, $p<.01$), and imagery of counterfactuals, $r(114) = .56$, $p<.01$), but negatively correlated with counterfactual valence, $r(114) = -.23$, $p<.05$. Regarding individual differences, neither rumination nor religiosity was found to correlate with the phenomenology of memory and counterfactuals. However, suppression as an emotion regulation strategy was found to be positively correlated with the emotional intensity of counterfactuals, $r(114) = .20$, $p<.05$. Correlation coefficients and descriptive statistics of the study variables for the upward and downward groups are presented in Table 1 and 2.

Table 3.1. Pearson correlation coefficients for the study variables in the upward group.

	Mean(*SD*)	1	2	3	4	5	6	7	8	9	10	11
1.Memory Valence	1.78(*0.58*)											
2.Memory Intensity	2.95(*1.18*)	-.314*										
3.Memory Reliving	3.81(*1.12*)	-.272*	.631*									
4.CFT Valence	2.32(*0.84*)	.425*	-.227	-.246								
5.CFT Intensity	3.08(*1.11*)	-.285*	.669*	.343*	-.452*							
6.CFT Reliving	2.97(*1.27*)	-.263*	.641**	.491**	-.328*	.608**						
7.CFT Imagery	3.32(*1.10*)	-.154	.554**	.536**	-.318**	.661**	.719**					
8.Rumination	24.66(*4.54*)	.070	.-209	-.158	.026	-.241	-.183	-.054				
9.Reflection	18.35(*7.22*)	-.006	-.100	.090	.078	-.139	-.115	-.127	-.091			
10.Suppression	25.77(*9.71*)	-.014	.090	.243	-.017	.102	.061	.137	-.087	.060		
11.Religiosity	44.88(*9.36*)	.111	.063	-.038	.047	-.129	-.083	-.201	.034	-.203	-.132	

Note. *$p < .05$, **$p < .001$.

Table 3.2. Pearson correlation coefficients for the study variables in the downward group.

	Mean(*SD*)	1	2	3	4	5	6	7	8	9	10	11
1.Memory Valence	1.78(*0.45*)											
2.Memory Intensity	3.18(*1.17*)	-.303*										
3.Memory Reliving	3.73(*1.16*)	-.426**	.527**									
4.CFT Valence	1.96(*0.76*)	.292*	-.054	-.260								
5.CFT Intensity	3.42(*1.13*)	-.426**	.430**	.369**	-.407**							
6.CFT Reliving	3.02(*1.25*)	-.250	.439**	.321*	-.172	.711**						
7.CFT Imagery	3.51(*1.20*)	-.400**	.433**	.593**	-.321*	.685**	.621**					
8.Rumination	25.21(*5.56*)	-.101	-.068	.026	-.178	.053	.099	.120				
9.Reflection	24.77(*6.97*)	.245	-.150	-.028	-.044	-.198	-.198	-.110	-.101			
10.Suppression	21.67(*6.25*)	-.394**	-.074	.097	-.167	.269	-.080	.098	-.078	-.009		
11.Religiosity	44.09(*10.28*)	.036	-.089	.089	-.257	.130	.112	.131	.027	-.057	.154	

Note. *$p < .05$, **$p < .001$.

3.2. Manipulation Check

We tested the mood ratings provided just after autobiographical recall, after the participants in the enhancement group and the control group watched the positive and neutral video clips and after writing counterfactuals, respectively. A two-way mixed ANOVA was conducted with mood (after memory, after videos and after counterfactuals) as the within-subjects variable and manipulation groups (enhancement vs. control) as the between-subjects variable. The analysis of variance (ANOVA) revealed a significant main effect of the mood, $F(2, 224) = 29.56$, $MSE = 9.07$, $p < .001$, indicating that the mood ratings differed significantly depending on the time of measurement (i.e., after memory, after videos, and after counterfactuals). Further pairwise comparisons with Bonferroni correction indicated that, compared to the mood ratings provided just after the autobiographical recall (Time 1, $M = 2.65$, $SD = 0.08$) and after counterfactuals (Time2, $M = 2.76$, $SD = 0.07$), individuals felt more positive emotions after watching videos (Time3, $M = 3.19$, $SD = 0.67$) , $p < .001$. However, we could not find significant difference between mood ratings after memory and after counterfactuals, $p = .31$. These results indicated that individuals returned the baseline level after engaging counterfactuals.

The main effect of manipulation groups is not significant**,** $F(1,112) = 1.44$, $MSE = 1.72$, $p = .23$, but the interaction between mood and manipulation groups was significant, $F(1, 112) = 5.50$, $MSE = 1.71$, $p < .05$. To further explore the interaction between mood ratings and manipulation groups, one way repeated measures ANOVA was conducted separately for enhancement and control groups. There is significant difference between mood ratings provided after writing memory, after watching videos and after producing counterfactuals in the enhancement group, , $F(2, 98) = 22.93$, $MSE = 7.44$, $p < .001$, and control group, $F(2, 126) = 7.39$, $MSE = 2.17$, $p < .001$.

Further pairwise comparisons suggested that enhancement group rated more positive mood after watching video (M = 3.38, SD = 0.66) compared to after writing memory (M = 2.66, SD = 0.77) and after counterfactuals (M = 2.78, SD = 0.78); control group also showed the same pattern (M = 3.00, SD = 0.73 for Time1; M = 2.75, SD = 0.76 for Time2; M = 2.75, SD = 0.75 for Time3).

Independent sample t-tests were conducted for each level of mood (i.e., after memory, after videos, and after counterfactuals) to compare group differences. The results showed no significant differences between the enhancement and control groups for mood ratings after memory, $t(112) = 0.121$, $p = .90$, or after counterfactuals, $t(112) = 0.206$, $p = .83$. However, there was a significant difference between the two groups for mood ratings after watching videos, $t(112) = 2.853$, $p = .005$. Specifically, participants in the enhancement group reported significantly more positive mood (M = 3.38, SD = 0.66) than participants in the control group (M = 3.00, SD = 0.73) after watching videos.

Overall, the results of the study showed a significant improvement in mood from after memory writing to after watching videos for both the enhancement and control groups. However, this effect did not persist after engaging in counterfactual thinking. Additionally, independent sample t-tests revealed that there were no significant mood differences between the two groups after writing memories or engaging in counterfactual thinking. However, participants in the enhancement group reported significantly more positive mood compared to those in the control group after engaging in counterfactual thinking. These findings suggest that individuals' moods improved in both groups, but the improvement was greater in the enhancement group.

3.3. Main Results: Discovering the Role of Counterfactuals in Mood Regulation

In this section, a three-way mixed ANOVA was conducted to test the effects of mood enhancement (positive vs control) and counterfactual types (upward vs downward) on mood change (mood after videos and after counterfactuals). Mood groups (enhancement vs. control) and counterfactual types (upward vs. downward) were between-subject variables, and mood change (mood after videos and after counterfactuals) was a within-subject variable.

The main effect of mood change was significant, $F(1,110) = 30.67$, $MSE = 9.17$, $p < .001$. Pairwise comparisons using Bonferroni correction indicated individuals in general reported more positive emotions after watching video ($M = 3.17$, $SD = 0.72$) than after writing episodic counterfactuals ($M = 2.76$, $SD = 0.84$). There was no main effect of mood enhancement $F(1, 110) = 3.28$, $MSE = 2.59$, $p = .07$, or the type of counterfactuals provided on mood, indicating enhancement group ($M = 3.08$, $SD = 0.66$) and control group ($M = 2.86$, $SD = 0.73$), and upward group (M= 3.01, $SD = 0.72$) and downward group ($M = 2.93$, $SD = 0.82$) rated mood provided comparable mood ratings mood similarly.

However, there was a significant interaction between mood and manipulation, $F(1, 110) = 4.53$, $MSE = 1.35$, $p < .05$. Further, post-hoc paired-samples t-test showed that there is significant difference between mood ratings provided after watching videos and after writing counterfactuals in the enhancement group, $t(49) = 4.58$, $p < .001$, and control group, $t(63) = 3.00$, $p < .05$. Descriptive statistics showed that enhancement group rated more positive mood after watching video ($M = 3.38$, $SD = 0.66$) compared to after writing counterfactuals ($M = 2.78$, $SD = 0.79$); control group also showed the same pattern ($M = 3.00$, $SD = 0.73$ for Time2; $M = 2.75$, $SD = 0.76$ for Time3). The results indicated that the effect of positive mood could not be maintained after engaging in counterfactual thinking, as the mood decreased regardless of the mood group.
The interaction between mood and counterfactual type was significant as well, $F(1, 110) = 4.15$, $MSE = 1.24$, $p < .05$. Post-hoc paired samples t-test showed that there is significant difference between mood ratings provided after watching videos and after writing counterfactuals in the upward group, $t(59) = 2.96$, $p < .05$ and downward group, $t(55) = 4.55$, $p < .001$. Descriptive statistics showed that upward group rated more positive mood after watching videos ($M = 3.14$, $SD = 0.64$) compared to after writing counterfactuals ($M = 2.88$, $SD = 0.70$); downward group also showed the same pattern ($M = 3.21$, $SD = 0.80$ for following videos; $M = 2.65$, $SD = 0.82$ for writing counterfactuals). These results suggested that the decline in mood regardless of counterfactual types. An independent sample t-test was conducted to compare the magnitude differences in mood change between the upward and downward counterfactual groups. The mean difference score (after videos vs. after counterfactuals)

was significantly larger for the downward group (M = 0.56, SD = 0.91) compared to the upward group (M = 0.25, SD = 0.65), $t(114) = -2.07$, $p < .05$, indicating a greater decline in mood after writing counterfactuals in the downward group.

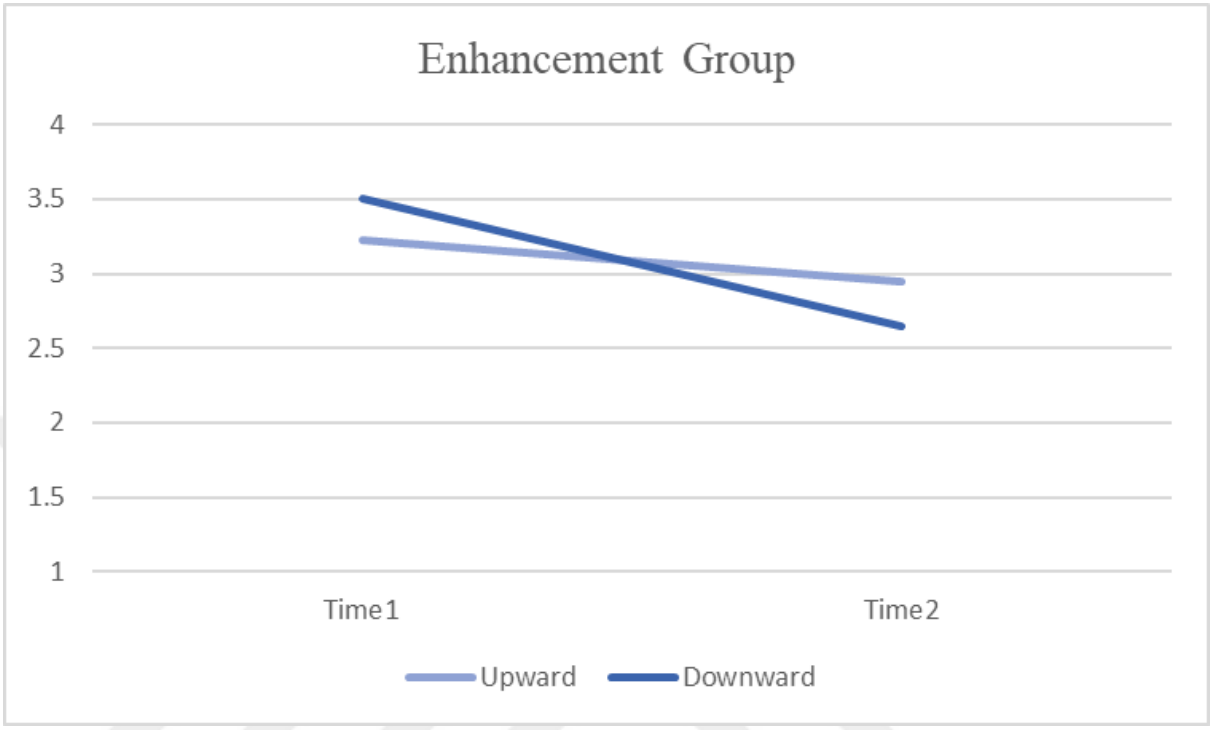
Three-way interaction between counterfactual type, manipulation group, and mood was not significant, $F(1,110) = 3.72$, $MSE = 1.11$, $p = .056$

Table 3.3. Means and Standard Deviations of Time2 and Time3 Mood for Manipulation Groups and Counterfactual Types.

	Positive				Neutral			
	Upward		Downward		Upward		Downward	
Mood	M	SD	M	SD	M	SD	M	SD
Time1	3.23	.68	3.50	.63	3.05	.62	2.93	.87
Time2	2.95	.72	2.64	.84	2.51	.70	2.67	.83

Notes. Time1: mood provided after watching videos; Time2: mood provided after writing counterfactuals.

Figure 3.1. Mood scores by Time1 (after watching videos) and Time2 (after writing counterfactuals) for upward and downward groups.



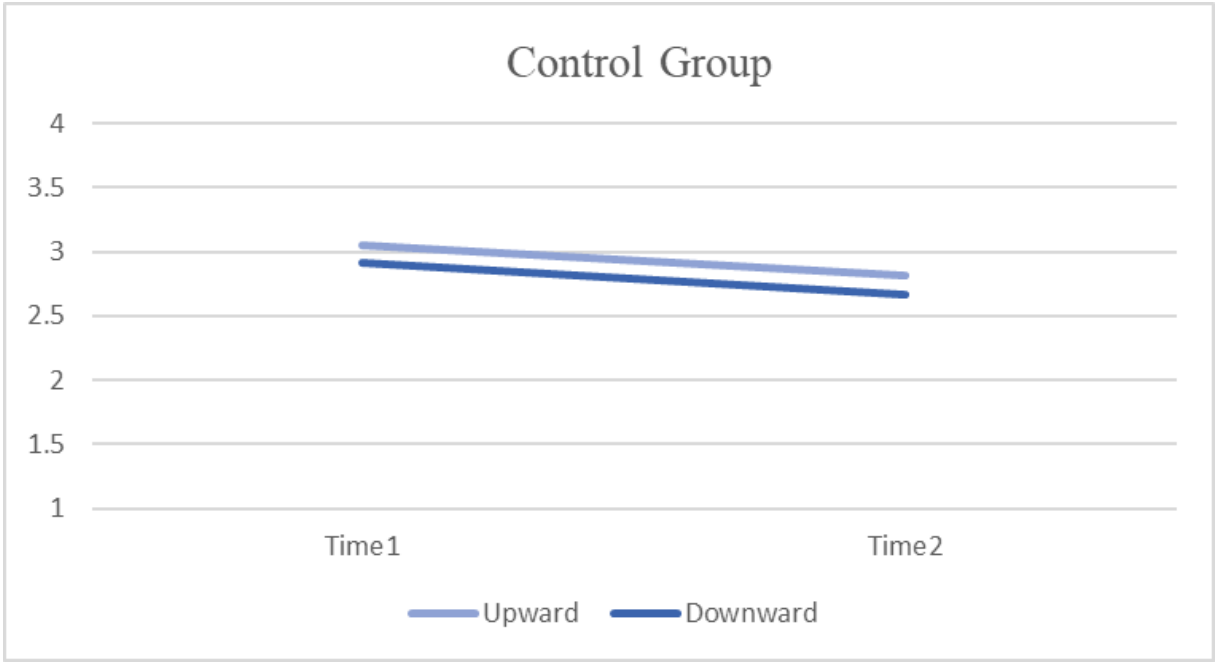
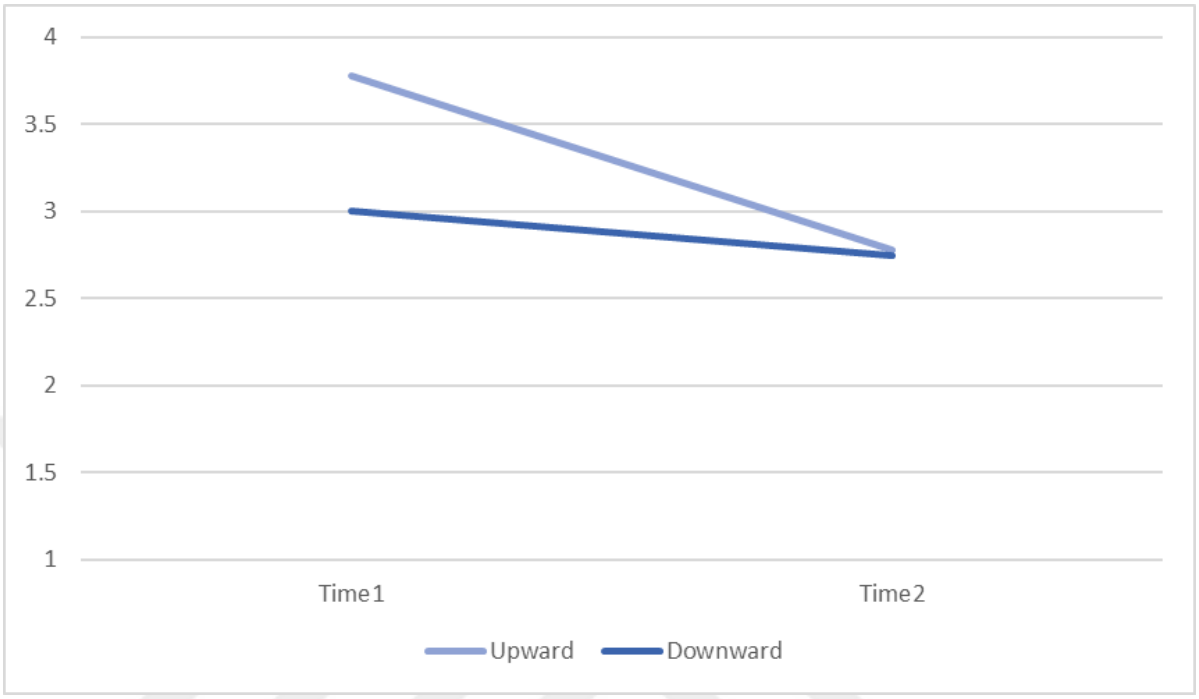


Figure 3.2 Total mood scores by Time1 (after watching videos) and Time2 (after writing counterfactuals) for upward and downward groups.



3.4. The Role of Counterfactuals Phenomenology in Mood Regulation

We argued that the phenomenology of counterfactuals differentially influences the effectiveness of mood repair across enhancement groups. For that reason, in the next step, we conducted three separate three-way mixed ANCOVA to test the effects of mood enhancement and counterfactual type on mood change while controlling for the phenomenological characteristics of counterfactuals. Mood groups (enhancement vs. control) and counterfactual types (upward vs. downward) were between-subject variables, and mood change (mood after videos vs. mood after counterfactuals) was the within-subject variable. Reliving, imagery, emotional intensity and valence of counterfactual thoughts were entered as the covariates in each analyses.

The covariate, reliving, was significantly related to the participant's mood, $F(1, 109) = 17.16$, $MSE = 11{,}80$, $p < .001$. There was a significant main effect of manipulation (positive vs. control) on mood after controlling for the effect of reliving, $F(1, 109) = 4.29$, $MSE = 2.95$, $p < .05$. Control group ($M = 2.76$, $SE = 0.07$) felt less positive than the positive group (M = 3.17, SE = 0.06). Counterfactual type remained insignificant after controlling for the reliving, $F(1, 109) = .33$, $MSE = .23$, $p = .56$. In addition, the main effect of mood disappeared after controlling for the reliving, $F(1, 109) = .28$, $MSE = .08$, $p = .59$.

The pattern of all two-way interactions were maintained after controlling for the effect of reliving, showing significant interactions between manipulation and mood, $F(1, 109) = 4.37$, $MSE = 1.28$, $p < .05$), and also between counterfactual types and mood, $F(1, 109) = 4.03$, $MSE = 1.18$, $p < .05$. The interaction between manipulation and counterfactual types was still insignificant, $F(1, 109) = .84$, $MSE = .58$, $p = .36$.

While the covariate effect of imagery, was significantly related to the participant's mood, $F(1, 109) = 6.95$, $MSE = 5.20$, $p < .05$, the main effects of mood, $F(1, 109) = .49$, $MSE = .14$, $p = .48$, mood enhancement (positive vs. control), $F(1, 109) = 2.66$, $MSE = 1.99$, $p = .10$, and counterfactual type, $F(1, 109) = .14$, $MSE = .10$, $p = .70$, disappeared after controlling for the effect of imagery.

The pattern of two-way interactions were mostly maintained, showing an insignificant interaction between manipulation and counterfactual types, $F(1, 109) = .74$ $MSE = .55$, $p=.39$, and a significant interaction between manipulation and mood, $F(1, 109) = 4.92$, $MSE = 1.46$, $p < .05$. However, the interaction between counterfactual types and mood became insignificant after controlling for the imagery, $F(1, 109) = 3.62$, $MSE = 1.08$, $p=.60$.

The covariate, emotional intensity, was significantly related to the participant's mood, $F(1, 109) = 12.52$, $MSE = 8.94$, $p< .001$. There was a significant main effect of manipulation (positive vs. control) on mood after controlling for the effect of emotional intensity, $F(1, 109) = 3.94$, $MSE = 2.81$, $p < .05$. Control group ($M = 2.85$, $SE = 0.07$) felt less positive than the positive group ($M = 3.08$, $SE = 0.08$). Counterfactual type remained insignificant after controlling for the emotional intensity, $F(1, 109) = .019$, $MSE = .013$, $p=.89$). In addition, the main effect of mood disappeared after controlling for the emotional intensity, $F(1, 109) = .038$, $MSE = .011$, $p=.84$.

The pattern of all two-way interactions were maintained after interactions controlling for the effect of emotional intensity, showing significant interactions between manipulation and mood, $F(1, 109) = 4.44$, $MSE = 1.30$, $p < .05$. The interaction between counterfactual types and mood, $F(1, 109) = 3.12$, $MSE = .91$, $p=.80$, and also manipulation and counterfactual types was insignificant, $F(1, 109) = .64$, $MSE = .46$, $p=.42$.

The covariate effect of valence was significantly related to the participant's mood, $F(1, 109) = 12.76$, $MSE = 9.09$, $p< .001$, however, the overall pattern of the findings were maintained after controlling for the effect of valence. The main effects of mood was significant, $F(1, 109) = 41.56$, $MSE = 10.49$, $p< .001$, while the effect of enhancement, $F(1, 109) = 3.35$, $MSE = 2.38$, $p =.10$, and counterfactual type, $F(1, 109) = .007$, $MSE = .005$, $p=.93$. were nonsignificant.

When we looked into the two-way interactions, the interaction between manipulation and counterfactual types remained insignificant, $F(1, 109) = 41.56$, $MSE = 10.49$, $p< .001$, and the interaction between manipulation and mood remained significant after

controlling for the effect of valence, $F(1, 109) = 5.82$, $MSE = 1.47$, $p < .05$). However, the interaction between counterfactual types and mood became insignificant after controlling for the valence, $F(1, 109) = 1.42$, $MSE = .36$, $p = .23$.

In summary, according to our analyses, there was a decline in individuals' emotional states after writing their counterfactual thoughts, but we did not find a significant difference in phenomenological and mood ratings between the counterfactual groups. Additionally, according to the ANOVA results, positive mood does not have a significant contribution to emotion regulation. However, according to the ANCOVA results, after controlling for phenomenological features such as emotional intensity, imagery, and reliving, the significant change in mood ratings became non-significant.

Table 3.4. Means and Standard Deviations of Phenomenological Features for Counterfactual Types.

	Positive				Neutral			
	Upward		Downward		Upward		Downward	
	M	SD	M	SD	M	SD	M	SD
Valence	2.27	.76	2.04	.69	2.35	.88	1.89	.84
Emotional Intensity	3.00	1.13	3.54	1.10	3.14	1.00	3.30	1.17
Reliving	2.86	1.24	3.18	1.09	3.03	1.30	2.85	1.40
Imagery	3.00	1.11	3.57	1.06	3.51	1.07	3.44	1.34

3.5. Exploratory Analyses to predict the effect of Episodic Counterfactuals on Mood

We conducted hierarchical regression analysis to examine the factors predicting the mood state after writing the counterfactual thoughts. Mood after the videos was entered in the first step, which was followed by the counterfactual type in the second step. In the next steps, we examined the different effects of phenomenological features. We included the valence, imagery, reliving, and emotional intensity of counterfactuals into

the model. After the phenomenological features, in the following steps, we added reflection and rumination, which are individual differences, to the model, respectively.

Table 5 shows the results of hierarchical regression analysis with Time2 mood (after writing counterfactual thoughts) as the dependent variable. In the first step of the regression, Time1 mood (mood after the videos) was a significant predictor of Time2 mood. The first model was significant and explained 15% of the variance, $F(1,107) = 19.51$, $p<0.05$. In the second step, counterfactual types explained an additional 3% of the variance, $F\ (1,106) =4.93$, $p < 0.05$.
In the third step of the analysis, inclusion of phenomenological features of counterfactuals (valence, imagery, reliving and emotional intensity) accounted for an additional 23% increase in the explained variance, $F(4,102) = 10.36$, $p < 0.001$. However, valence and reliving of counterfactuals were significant predictors of Time2 mood (after writing counterfactuals), neither imagery nor emotional intensity were significant predictors of mood. After adding the phenomenological features in step 3, the counterfactual type is no longer a significant predictor (p=.17).

Finally, individual differences such as reflection and rumination entered into the model. Rumination and reflection accounted for additional 4% increase in the explained variance, $F\ (2,100) = 3.79$, $p < 0.05$.

In the final model, Time1 mood, valence, reliving of counterfactuals, and rumination remained as significant predictors. In general, based on the regression model, it was indicated that the initial mood's negativity (mood at Time1) (β = .39) was a predictor of the level of negative emotion experienced following the counterfactual reports. Moreover, high rumination (β = -.15) as well as more negative memories recalled (β = .38) with greater sense of reliving (β = -.28) predicted more negative mood reports after writing counterfactuals.

Table 3.5. Hierarchical Regression Analysis for Time3 Mood as Outcome Variable.

Step	Predictors	ΔR^2	DF	*F- change*	B	SE	β
1		0.15	1,107	19.51***			
	Time1 Mood				.41	.09	.39***
2		0.03	1,106	4.93*			
	Time1 Mood				.41	.09	.39***
	Counterfactual Type				.29	.13	.19*
3		0.23	4,102	10.36***			
	Time1 Mood				.34	.08	.32***
	Counterfactual Type				.16	.11	.10
	Valence				.37	.08	.39***
	Imagery				.09	.07	.14
	Reliving				-.17	.06	-.29**
	Emotional Intensity				-.01	.08	-.23
4		0.04	2,100	3.79*			
	Time1 Mood				.38	.08	.36***
	Counterfactual Type				.14	.11	.09
	Valence				.35	.08	.38***
	Imagery				.11	.07	.17
	Reliving				-.17	.06	-.28**
	Emotional Intensity				-.02	.07	-.04
	Rumination				-.02	.01	-.15*
	Reflection				.01	.007	.11

Note: *$p < .05$, **$p < .01$, ***$p < .001$.

4. DISCUSSION

The primary goal of the present study was to examine the effect of distinct episodic counterfactuals (upward vs. downward) on the regulation of negative emotions linked with negative autobiographical memories. Second, we aimed to test whether the functions of the counterfactuals may be supported through positive mood induction as positive mood alters the emotional context and makes positive representations more available for the individual. Third, we examined the role of the phenomenology of counterfactuals and their significance in the modulation of mood. Last, we investigated the potential influence of individual differences such as rumination, religiosity and emotion regulation strategies on the effectiveness of counterfactuals in regulating negative emotions.

As we expected, exposure to positive videos resulted in mood enhancement, which helped them to repair the negative emotions induced by the autobiographical recall. However, although we expected, mood enhancement would be preserved after the writing of the counterfactual thoughts, individuals returned to their baseline in that their emotions were as negative as they reported negative autobiographical memories. This pattern was consistent across the types of counterfactuals they reported, indicating that overall, thinking about alternatives about a negative experience led to a decrease in mood, regardless of whether these alternative scenarios, the counterfactuals, were upward or downward direction.

Previous studies have suggested that engaging episodic simulation and memory activates the same brain network, proposing the degree of commonality between these mental processes (Schacter et al., 2015). Furthermore, counterfactual thinking constitutes the contextual structure with the characteristics of episodic memory and displays the similarities in terms of space, temporality, and details. Accordingly, some researchers have argued that counterfactual thought can act as a potent reminder of memory itself (Parikh, 2019). This reminder could activate the same neural network as episodic memory, leading to the reinstatement of the original memory and its associated negative emotions. In that sense, it is very likely that episodic counterfactuals originate

from the same mental representation of the associated memory and have the potential to activate similar emotions. This might not only heighten the negative emotions associated with the negative memory and then lead to the decline in mood observed after the report of counterfactuals, but also prevent a potential regulation function that the counterfactual thoughts could serve. (Epstude & Roese, 2008). Similarly, we found a positive correlation between the phenomenology of memories and counterfactual thoughts, supporting the notion that counterfactuals serve as reminders of original memories. In addition, the positive mood manipulation was not that much effective to override the negative emotionality activated by the autobiographical recall and the reliving of those emotions may have a stronger effect on a person's present state of mind compared to emotions, which may prevent individuals to benefit from the positive emotional context and interfere emotion regulation.

4.1. The Role of Counterfactuals in Emotion Regulation

Our main concern was to characterize the role of distinct episodic counterfactuals (upward vs. downward) in the regulation of negative emotions elicited by the autobiographical recall. Thinking over what could have been different in the past is a form of cognitive reappraisal, by which individuals can distance themselves from the original event and look for ways to see the past through a different lens (Kray et al., 2006). This also influences the associated emotions in a way to reduce their negativity and the intensity, as well (Roese & Olson, 1997). In line, we expected that counterfactual thinking would serve emotion regulation and downward counterfactuals would be more effective than upwards to decrease negative emotions. However, the findings did not support our hypothesis and we did not observe dissimilarity in the impact of upward and downward counterfactuals on mood evaluations. However, the phenomenology of upward and downward counterfactuals had an effect on how counterfactual types influenced mood changes. There are several explanations for this pattern.

Previous studies have demonstrated that counterfactual thinking can serve as a regulatory mechanism of mood (Roese & Olson, 2014; Sanna et al., 1999). They used laboratory tasks (Markman et al., 1993) and hypothetical scenarios (Sanna et al., 1999) where participants generate counterfactual thoughts based on game outcomes or imaginary events. Few studies investigated how counterfactual thinking affects mood in real-life situations (Sanna et al., 2001). They asked college students to create counterfactuals based on their academic performance. Unlike previous studies, we asked individuals to write negative autobiographical memories. This could prevent the generation of alternative ways to alleviate negative emotions. This is because some negative events can have a greater impact than failing a test or losing a game. Thus, using counterfactual thoughts for emotion regulation in episodic contexts may be more difficult than laboratory tasks or hypothetical scenarios. From this perspective, it is possible that the level of closure of an episodic memory can prevent the emotion regulation function of counterfactuals. Closure, which means a feeling of relief that arises when the resolution of a negative event occurs, may be an essential factor in determining the impact of counterfactuals on affective responses (Beike et al., 2004).

According to Beike (2005), individual memories can be classified into two categories, open and closed, based on their sense of closure and the persistence of emotional impact. Closed events have already been processed and abstracted with a meaning attached, while open events still have room for resolution and elaboration. Furthermore, open events are often accompanied by negative valence, a heightened degree of reliving, and emotional intensity (Crawley, 2010). This increased phenomenology may make open events highly susceptible to intrusion, resulting in greater accessibility of open memories within the memory system (Barzykowski et al., 2019; Ergen & Gülgöz, 2022). In the present study, we believed that the phenomenology of initial memories might have a role in mood repair therefore, individuals were requested to evaluate the phenomenology of initial memories which allowed us to examine how the reliving and emotional intensity of these memories affect mood regulation. In our study, reported events may be classified as open memories due to the high emotional impact of the narrated memories. Strong emotions associated with these memories may render them highly accessible, thus triggering the emergence of intrusive thoughts. This could impair adaptive emotional processing, which is essential for effective emotion regulation (Baker & Berenbaum, 2007). In addition, the vivid and highly emotional recollection of an event may provoke a similar emotional reaction as experienced during the occurrence of the original incident. These characteristics could potentially hinder an individual's capacity to generate different viewpoints. In other words, since the tangible representation of events within memory storage may restrict the attention needed for producing counterfactual thoughts. In conclusion, the phenomenology of initial memories could have an impact on the generation of counterfactuals and mood regulation processes. This highlights the importance of understanding how original memories, with their heightened emotional intensity and greater accessibility, can impact emotion regulation and counterfactual thinking.

In addition, psychological distance is an individual's subjective evaluation of the proximity of objects or events (Liberman et al., 2007). Although this study did not specifically evaluate the psychological distance of events, this phenomenon may affect mood repair through counterfactuals in two distinct ways: distancing from events and counterfactual thoughts. First, it is possible that highly emotionally charged memories,

as in the case of open events, are perceived as being psychologically closer(Beike et al., 2007; Crawley, 2010). Psychologically proximal memories are more easily accessible than distal memories, thus conceptualizing those events as being closer can lead to more concrete thinking about those events, rather than abstract thinking (Liberman et al., 2002). Therefore, the psychological distance of the initial memory could prevent mood repair through counterfactual production because of their accessibility. Furthermore, we instructed participants to generate counterfactual thoughts from a first-person, self-referential perspective. Nevertheless, it is feasible that adopting an observer perspective, i.e., other referent perspectives, may demonstrate benefits in the context of processing particular emotions (Wang et al., 2012). Since observer perspectives put some distance between the self and the event, they can reduce the emotional reactions to events. It is also important to note that there is not much information regarding the regulation of emotions through counterfactual thoughts from distinct referential perspectives. Therefore, future research should consider manipulating the distinction between counterfactual thoughts framed from the self and other referential perspectives to investigate their influence on the affective process.

4.2. Does Upward vs Downward counterfactual thinking differ?

We expected a significant difference between upward vs. downward counterfactuals in the regulation of negative emotions. More specifically, we hypothesized that the production of downward counterfactuals (i.e., considering worse alternatives) would enhance mood, possibly serving as a tool for emotion regulation by providing relief in case the worst alternative does not happen compared to the actual situation. Contrary to our predictions, both downward- and upward-groups provided comparable mood ratings, suggesting that the downward counterfactual thinking is not more effective than the upward in mood change.

The Reflection and Evaluation Model (REM) proposes that engaging in counterfactual thinking involves two mindsets (Markman & McMullen, 2003). The first is the reflection mindset, where individuals focus solely on the counterfactual thoughts without comparing them to the actual event. This results in an affective assimilations,

where individuals tend to feel better after creating upward counterfactuals (i.e., considering better alternatives, or worse after creating downward counterfactuals, i.e., considering worse alternatives, leading to the mood congruence effect). The second mindset is the evaluation, where individuals compare the actual event to the counterfactual, resulting in affective contrast. Affective contrast suggests that generating upward counterfactuals provokes negative feelings, while creating downward counterfactuals provides positive emotions. In our study, we found that both upward and downward groups' mood decreased, indicating affective contrast for upward and affective assimilation for downward counterfactuals. A counterfactual-based approach can be a useful tool for regulating emotions by taking into account individual mindsets. Specifically, generating upward counterfactuals might be helpful for individuals who tend to focus on the possibilities without comparing them to the actual event, i.e., those with a reflection mindset. This approach can provide alternative and more positive scenarios, which may improve their mood (Markman et al., 2008). Conversely, individuals who tend to compare the actual event and the counterfactual, i.e., those with an evaluative mindset, may benefit from generating downward counterfactuals to regulate their emotions. This approach can highlight the positive aspects of the actual event by creating a worse alternative, potentially increasing their satisfaction and improving their mood (McMullen & Markman, 2000).

The absence of group differences between upward and downward counterfactual thinking could be the inherent difficulty in generating counterfactuals for each context, particularly when they serve as a reappraisal strategy. Recent studies have revealed that the efficacy of a reappraisal strategy as a coping strategy may differ based on the context (Troy et al., 2013). They suggested that reappraisal can lead to favorable outcomes in uncontrollable circumstances, such as grief, as it facilitates reframing emotional reactions to alleviate negative emotions. Conversely, reappraisal may not be as effective in controllable situations, such as interpersonal conflicts, where expressing negative feelings may be required to initiate problem-solving behaviors. Our research required a negative interpersonal conversation as a memory, which is a manageable situation. From the perspective of upward counterfactuals, their construction can be dysfunctional as they may amplify feelings of regret (Broomhall & Phillips, 2018)

instead of functioning as an emotion regulation mechanism in manageable situations. In such situations where individuals need problem solving behaviors to deal with it, promoting upward counterfactuals as a problem-focused strategy can increase behavioral intentions to reinstate prospective purposes (Byrne, 2016; Epstude & Roese, 2011). Thus, the use of counterfactual thinking as an instrument for affect regulation could be ineffective in situations that permit control. On the other hand, it is highly likely that counterfactual thoughts can modify the phenomenological content of autobiographical memories (De Brigard et al., 2019). More specifically, engaging in downward counterfactuals may increase the level of detail associated with a negative memory. Based on these findings, the possible reason for the failure of downward counterfactual thinking to elevate emotions in our study could be the intensification of the vividness and specificity of the actual event in the memory system (Cooper & Ritchey, 2022). A detailed, vivid memory of a negative event may interfere with the production of counterfactual thoughts, leading to reduced effectiveness of mental simulation as a tool for emotion regulation. Limited research has explored how counterfactual thinking alters the phenomenology of original events. Therefore, future studies should investigate the changes in phenomenology that occur when engaging in alternative scenarios, in order to better understand their cognitive and emotional functions.

Finally, in our study, only valence showed a significant difference between counterfactual types. However, we could not find difference between upward and downward counterfactuals in terms of other phenomenological qualities. The similarity between the characteristics of both counterfactual thoughts can explain the absence of group differences in emotion regulation. The following section will explain the role of counterfactual phenomenology in modulating emotions.

4.3. The Role of Counterfactual Phenomenology in Modulating Emotional Response

Previous research on phenomenological features has demonstrated that reports of episodic simulation, such as future and counterfactual thinking, are typically less vivid and less emotionally intense than past events (De Brigard & Giovanello, 2012). In line

with previous studies, our study revealed that negative memories were evaluated with a greater sense of reliving than counterfactual thoughts. Contrary to previous research, individuals in our study reported autobiographical memories with a lower level of emotional intensity than counterfactual thoughts, though this difference was not statistically significant. Furthermore, memories are perceived as more negative than counterfactual thoughts.

Current findings indicated that the upward counterfactuals for a negative past event were rated more positively than downwards. Although downward counterfactuals were rated with a slightly higher level of reliving, emotional intensity, and imagery, we could not find statistically significant differences between the two types of counterfactuals for these features. Regarding their distinct effects on mood, we expected that the phenomenology of counterfactuals would differentially affect the efficacy of mood repair across mood enhancement groups. Consequently, we examined the effect of each phenomenological factor on mood change. We found that mood change disappeared after controlling for emotional intensity, reliving, and imagery; however, it remained significant after controlling for valence. This is important as we showed that difference in the phenomenology of counterfactual thoughts plays a role in subsequent emotional experiences. In other words, characteristics other than valence are influential in altering mood, indicating that the direction of counterfactual generation may not be a determining factor in subsequent information processing.

This result suggested that the production of counterfactual thoughts identified by heightened degree of reliving, imagery, and emotional intensity serves as a potent trigger for the reactivation of the initial event and the associated emotions. Specifically, maintaining a vivid representation of the counterfactual scenario in one's mind may stimulate the original memory and the emotions associated with it, amplifying the initial affective response and influencing subsequent emotional experiences. On the other hand, some researchers posited that producing counterfactual thoughts might affect how someone develops PTSD in the same way that traumatic memories do, according to the mnemonic model of PTSD (Blix et al., 2016, 2018). This model says that it is not the event itself that affects how bad the symptoms are, but how the person remembers it (Rubin et al., 2008). For example, someone who survived a traffic accident with minor

injuries may feel relieved. On the other hand, an individual may think about the possibility of his death, which in turn, increases his negative emotions. This is because vivid counterfactual thoughts about what could have happened can lead to negative affect (Kennedy, 2021). In this sense, phenomenology of counterfactuals could moderate the relationship between emotional states and counterfactuals. Previous studies have primarily examined on the content or direction of counterfactuals in relation to emotional experiences (Roese & Epstude, 2017). However, investigating the qualitative features of counterfactuals to better understand their mood-repair aspects could be beneficial.

4. 4. The role of Individual Differences in Regulating Emotions

We also examined individual differences to characterize their role in altering mood. Hierarchical regression was conducted to explore the role of individual dimensions and the qualitative characteristics of counterfactuals. In this regard, we focused exclusively on the emotion regulation strategies of rumination and reflection, as we did not find any significant associations between religiosity, suppression variables, and other factors. Our final model identified several predictors of subsequent emotional experience, including the initial mood measure, rumination, valence, and reliving of counterfactuals. Specifically, our findings suggest that the negativity of the initial mood is a strong predictor of negative emotions following the reporting of counterfactuals. Moreover, individuals who engage in high levels of rumination and report more negative counterfactuals, along with a heightened sense of relief, tend to experience more negative mood states afterwards.

These findings are important especially when we consider the effect of these emotion regulation strategies on information processing. Rumination has been conceptually characterized as persistent and obsessive repetitive thoughts dwelling on negative experiences (Nolen-Hoeksema, 2000). This tendency can impede cognitive control (Ferdek et al., 2016), leading to difficulty in inhibiting negative emotions bound to negative memories. Moreover, ruminative individuals tend to maintain a persistent

negative affect, which can limit their ability to engage in flexible thinking (Altan-Atalay et al., 2022). In this sense, this inflexibility may negatively impact their ability to utilize counterfactual thinking, which requires some degree of cognitive flexibility in considering alternative scenarios. As counterfactual thinking involves a degree of flexibility when contemplating events, excessive rumination may hinder an individual's focus on the emotion of such contemplations. This assumption implies that rumination may be a pattern of thinking that interrupts emotional processing, thereby regulating emotions through counterfactual thinking. On the other hand, rumination could be related not only to being stuck in past events and associated negative emotions but also to repetitive thinking about counterfactual thoughts. In our study, we did not ask the frequency of engaging in counterfactual thinking but it is very likely that frequent engagement in counterfactual thinking and rumination has a bidirectional relationship. More specifically, rumination may lead to excessive counterfactual thinking, which can further increase rumination on the past instead of helping individuals reappraise the event and gain new perspectives. Such repetitive thinking related to counterfactuals could also amplify counterfactual-based negative emotions, such as regret (Allaert et al., 2019). Repetitive thinking moderated the relationship between regret derived from upward counterfactuals and symptoms of depression (Roese et al. 2009). Kennedy et al. (2021) also found that the frequency of counterfactual thinking for all types is positively correlated with prolonged grief, post-traumatic stress disorder, and psychological stress, all of which might explain why counterfactual thought fail to repair negative emotions. In further studies, researchers can investigate how the interaction between different levels of engagement with counterfactual thinking and rumination can affect emotions and well-being.

Rumination influences how people remember personal experiences, including the recollection features (Lask et al., 2021). This kind of rehearsal amplifies the emotion connected to the memory and its phenomenological qualities. Specifically, individuals who incline to ruminate are likely to generalize memories (Williams et al., 2007), and recall events with a heightened emotional intensity (Lask et al., 2021). The connection between rumination and phenomenology may explain how emotion regulation can be impeded. It is possible that rumination could increase the phenomenological qualities of

the actual event, resulting in a decline in attention to the affective process in counterfactual composition. Since the selective retention of details and an obsessive preoccupation with the past impairs the capacity to engage in adaptive emotional processing, thereby preventing the development of effective emotion regulation (Joormann & Gotlib, 2010). Consequently, intensified phenomenological elements of the actual event could impact the subsequent emotional experience.

5. LIMITATIONS

The objective of the current study was to investigate the relationship between episodic counterfactual thoughts and emotion regulation. The findings revealed a negative impact of engaging in counterfactuals on emotion regulation. However, it is important to acknowledge the limitations of this study, which should be taken into account for future investigations. One limitation is that the study did not have a time break between sections, which might have resulted in cognitive overload and attention decline. To overcome this limitation, future studies should consider breaking up the study into separate sections, especially after writing memories. In addition, temporal intervals between sections could increase the psychological distance of initial memories (Kray et al., 2010). This increased psychological distance can allow for a re-evaluation of past events with reduced negative emotions. Consequently, engaging in counterfactual thinking may facilitate the reinterpretation of the past, rather than ruminating on it.

Second, in our pilot study, participants were allowed to write their counterfactual thoughts freely, which resulted in the majority of participants producing upward counterfactuals. This made it difficult to compare the differences in the phenomenology of counterfactuals. To address this issue in the main study, we manipulated participants' counterfactual thoughts to be either downward or upward. This enabled us to compare the phenomenological differences of counterfactual types. However, despite randomly assigning participants to the two groups, we were unable to detect significant differences in the phenomenology of distinct counterfactuals. Randomly assigning individuals to conditions may limit the production of counterfactuals, as people may have a bias towards thinking of either favorable or unfavorable alternatives to events. Specifically, individuals who consistently engage with better alternatives are more likely to effortlessly write upward counterfactuals, whereas those who habitually focus on negative alternatives may find it easier to construct downward counterfactuals. Therefore, thinking in the opposite direction could be challenging. Future studies can use a within-subjects design, which would allow the participants to create both upward and downward counterfactuals for an event. This approach can better control for

individual differences in counterfactual thinking and reduce the potential biases associated with assigning counterfactuals to specific conditions.

Furthermore, in our study, we did not ask participants to report the phenomenology of their initial memories after generating counterfactual thoughts. Previous research has proved that creating counterfactuals can heighten the phenomenology of initial memories (De Brigard et al., 2019). Investigating how the production of counterfactuals affects the phenomenology of memory representation is crucial, as the emotional function of counterfactuals may depend on the extent to which they modify the memory representation. If counterfactuals strengthen the representation of the initial memory, they may be less effective in regulating emotions. Hence, more research is needed to study the impact of counterfactual thinking on the phenomenology of memory and how it relates to emotional regulation.

Finally, in the current study, the majority of participants were female, which can be considered as a limitation in terms of the results. Additionally, even though the positive mood induction was successful, it did not improve the mood as much as expected. It could be a reason that the data for the study was collected online during the pandemic.

6. FUTURE DIRECTIONS

Previous research has mainly focused on the direction of counterfactuals and how they affect emotional experiences (Roese, 1994; Roese & Morrison, 2009; Sanna et al., 1999). Despite several limitations, current study revealed the role of counterfactual phenomenology in emotional experiences. More specifically, counterfactual thoughts heightened phenomenology (e.g., emotionality, vividness) may not be effective for emotion regulation but can be useful in preparing the individual for the future. For instance, encouraging individuals to vividly think about what might have been better could increase their behavioral intentions and prepare them for future planning and actions. In such cases, counterfactual thoughts that are particularly high in imaginability and vividness can be used as a cognitive restructuring technique in applied settings by therapists (Allen et al., 2014). Future studies could further investigate the interaction between the phenomenology of counterfactuals and their functionality, with implications for developing more effective strategies for emotional regulation and future planning.

Moreover, we found that rumination, as an individual difference, could interfere with the effectiveness of counterfactuals in regulating emotions. However, the connection between rumination and counterfactuals is not entirely clear. While some people consider counterfactuals as a subtype of rumination (Davis et al., 1995), rumination could affect counterfactuals in distinct ways. For example, it may increase the phenomenology and emotion of initial memories, which can result in an inability to focus on emotional processing based on counterfactuals. On the other hand, rumination could also increase the frequency of counterfactuals, which may lead to maladaptive forms of counterfactual thinking. Hence, additional research is needed to explore the intricate connection between rumination and counterfactual thinking, in order to enhance our comprehension of how they affects psychopathology.

Finally, in the current study, individuals wrote counterfactual thoughts from a self-referential perspective. However, it is possible that adopting a different viewpoint, such as an observer perspective or using other reference points, could be beneficial in

managing certain emotions (Wang et al., 2012). There is limited information available on the regulation of emotions through counterfactual thoughts from different reference points. Hence, future research should investigate the effects of manipulating the reference point when framing counterfactual thoughts on the emotional process.

7. CONCLUSION

Counterfactual thinking is a mental process that allows individuals to re-evaluate past events and find meaning in them (Kray et.al, 2010). However, counterfactuals can also have negative effects on mood if they serve as solid reminders of the actual events (Parikh,2019). Here, we aim to provide a novel framework to understand how we regulate our emotions and cope with adversity through exploring the interplay between mood, counterfactual thinking, and individual differences. Current evidence suggests that the effectiveness of counterfactuals in regulating emotions may depend not only on their valence or direction but also on their phenomenological features, which can moderate emotional experiences. Moreover, individual variations in rumination may be crucial in directing the regulatory functions of counterfactuals. The results of this study have noteworthy consequences for our comprehension of counterfactual cognition including its functional aspects, as well as the complex interplay between the phenomenology of counterfactuals, rumination, and emotion regulation. Further research is required to fully comprehend these relationships and investigate the possible therapeutic applications of counterfactual thinking in promoting adaptive emotional functioning.

REFERENCES

Addis, D. R., Pan, L., Vu, M.-A., Laiser, N., & Schacter, D. L. (2009). Constructive episodic simulation of the future and the past: Distinct subsystems of a core brain network mediate imagining and remembering. Neuropsychologia, 47(11), 2222–2238.

Addis, D. R., Wong, A. T., & Schacter, D. L. (2008). Age-related changes in the episodic simulation of future events. Psychological Science, 19(1), 33–41.

Alea, N., Arneaud, M. J., & Ali, S. (2013). The quality of self, social, and directive memories: Are there adult age group differences? International Journal of Behavioral Development, 37(5), 395–406.

Allaert, J., De Raedt, R., & Vanderhasselt, M.-A. (2019). When choosing means losing: Regret enhances repetitive negative thinking in high brooders. *Journal of Experimental Social Psychology*, *85*, 103850. https://doi.org/10.1016/j.jesp.2019.103850

Allen, M. S., Greenlees, I., & Jones, M. V. (2014). Personality, counterfactual thinking, and negative emotional reactivity. *Psychology of Sport and Exercise*, *15*(2), 147–154. https://doi.org/10.1016/j.psychsport.2013.10.011

Altan-Atalay, A., Kaya-Kızılöz, B., İlkmen, Y. S., & Kozol, E. (2022). Impact of abstract vs. concrete processing on state rumination: An exploration of the role of cognitive flexibility. Journal of Behavior Therapy and Experimental Psychiatry, 74, 101691.

Andrews-Hanna, J. R., Reidler, J. S., Sepulcre, J., Poulin, R., & Buckner, R. L. (2010). Functional-anatomic fractionation of the brain's default network. Neuron, 65(4), 550–562.

Arditte Hall, K. A., De Raedt, R., Timpano, K. R., & Joormann, J. (2018). Positive memory enhancement training for individuals with major depressive disorder. Cognitive Behaviour Therapy, 47(2), 155–168.

Atance, C. M., & O'Neill, D. K. (2001). Episodic future thinking. Trends in Cognitive Sciences, 5(12), 533–539.

Ayduk, Ö., & Kross, E. (2010). From a distance: Implications of spontaneous self-distancing for adaptive self-reflection. Journal of Personality and Social Psychology, 98(5), 809–829. https://doi.org/10.1037/a0019205

Baker, J. P., & Berenbaum, H. (2007). Emotional approach and problem-focused coping: A comparison of potentially adaptive strategies. Cognition and Emotion, 21(1), 95–118.

Barnett, M. D., & Maciel, I. V. (2021). Counterfactual Thinking Among Victims of Sexual Assault: Relationships with Posttraumatic Stress and Posttraumatic Growth. Journal of Interpersonal Violence, 36(17–18), 8652–8667. https://doi.org/10.1177/0886260519852629

Barzykowski, K., Niedźwieńska, A., & Mazzoni, G. (2019). How intention to retrieve a memory and expectation that a memory will come to mind influence the retrieval of autobiographical memories. Consciousness and Cognition, 72, 31–48. https://doi.org/10.1016/j.concog.2019.03.011

Beike, D. R., Adams, L. P., & Wirth-Beaumont, E. T. (2007). Incomplete inhibition of emotion in specific autobiographical memories. Memory, 15(4), 375–389. https://doi.org/10.1080/09658210701276850

Beike, D., & Wirth-Beaumont, E. (2005). Psychological closure as a memory phenomenon. Memory, 13(6), 574–593.

Berntsen, D. (1996). Involuntary autobiographical memories. Applied Cognitive Psychology, 10(5), 435–454.

Berntsen, D., & Bohn, A. (2010). Remembering and forecasting: The relation. Memory & Cognition, 38(3), 265–278.

Beukeboom, C. J., & Semin, G. R. (2005). Mood and representations of behaviour: The how and why. Cognition and Emotion, 19(8), 1242.

Blix, I., Kanten, A. B., Birkeland, M. S., Solberg, Ø., Nissen, A., & Heir, T. (2016). Thinking about what might have happened: Counterfactual thinking and post-traumatic stress in individuals directly and indirectly exposed to the 2011 Oslo bombing. Applied Cognitive Psychology, 30(6), 983–991.

Blix, I., Kanten, A. B., Birkeland, M. S., & Thoresen, S. (2018). Imagining what could have happened: Types and vividness of counterfactual thoughts and the relationship with post-t raumatic stress reactions. Frontiers in Psychology, 9, 515.

Branscombe, N., Wohl, M., Owen, S., Allison, J., & N'gbala, A. (2003). Counterfactual Thinking, Blame Assignment, and Well-Being in Rape Victims. Basic and Applied Social Psychology - BASIC APPL SOC PSYCHOL, 25, 265–273. https://doi.org/10.1207/S15324834BASP2504_1

Brewer, W. F. (1986). What is autobiographical memory. Autobiographical Memory, 25–49.

Broomhall, A. G., & Phillips, W. (2018). Self-referent upward counterfactuals and depression: Examining regret as a mediator. Cogent Psychology, 5, 1416884. https://doi.org/10.1080/23311908.2017.1416884

Broomhall, A. G., Phillips, W. J., Hine, D. W., & Loi, N. M. (2017). Upward counterfactual thinking and depression: A meta-analysis. Clinical Psychology Review, 55, 56–73.

Byrne, R. M. (2007). Precis of the rational imagination: How people create alternatives to reality. Behavioral and Brain Sciences, 30(5–6), 439–453.

Byrne, R. M. (2016). Counterfactual thought. Annual Review of Psychology, 67(1), 135–157.

Callander, G., Brown, G. P., Tata, P., & Regan, L. (2007). Counterfactual thinking and psychological distress following recurrent miscarriage. Journal of Reproductive and Infant Psychology, 25(1), 51–65.

Camille, N., Coricelli, G., Sallet, J., Pradat-Diehl, P., Duhamel, J.-R., & Sirigu, A. (2004).The involvement of the orbitofrontal cortex in the experience of regret. Science, 304(5674), 1167–1170.

Cooper, R. A., & Ritchey, M. (2022). Patterns of episodic content and specificity predicting subjective memory vividness. Memory & Cognition, 50(8), 1629–1643. https://doi.org/10.3758/s13421-022-01291-5

Crawley, R. A. (2010). Closure of autobiographical memories: The effects of written recounting from first- or third-person visual perspective. Memory, 18(8), 900–917. https://doi.org/10.1080/09658211.2010.524650

D'Argembeau, A., & Van der Linden, M. (2006). Individual differences in the phenomenology of mental time travel: The effect of vivid visual imagery and emotion regulation strategies. Consciousness and Cognition, 15(2), 342–350.

D'argembeau, A., & Van der Linden, M. (2008). Remembering pride and shame: Self-enhancement and the phenomenology of autobiographical memory. Memory, 16(5), 538–547.

D'Argembeau, A., & Van der Linden, M. (2012). Predicting the phenomenology of episodic future thoughts. Consciousness and Cognition, 21(3), 1198–1206.

Davis, C., Lehman, D., Wortman, C., Silver, R., & Thompson, S. (1995). The Undoing of Traumatic Life Events. Personality and Social Psychology Bulletin, 21, 109–124. https://doi.org/10.1177/0146167295212002

De Brigard, F. (2014). Is memory for remembering? Recollection as a form of episodic hypothetical thinking. Synthese, 191(2), 155–185.

De Brigard, F., Addis, D. R., Ford, J. H., Schacter, D. L., & Giovanello, K. S. (2013). Remembering what could have happened: Neural correlates of episodic counterfactual thinking. Neuropsychologia, 51(12), 2401–2414. https://doi.org/10.1016/j.neuropsychologia.2013.01.015

De Brigard, F., & Giovanello, K. S. (2012). Influence of outcome valence in the subjective experience of episodic past, future, and counterfactual thinking. Consciousness and Cognition, 21(3), 1085–1096.

De Brigard, F., Giovanello, K. S., Stewart, G. W., Lockrow, A. W., O'Brien, M. M., & Spreng,R. N. (2016). Characterizing the subjective experience of episodic past, future, and counterfactual thinking in healthy younger and older adults. Quarterly Journal of Experimental Psychology, 69(12), 2358–2375.

De Brigard, F., Hanna, E., St Jacques, P. L., & Schacter, D. L. (2019). How thinking about what could have been affects how we feel about what was. Cognition and Emotion, 33(4), 646–659. https://doi.org/10.1080/02699931.2018.1478280

De Brigard, F., Szpunar, K. K., & Schacter, D. L. (2013). Coming to grips with the past: Effect of repeated simulation on the perceived plausibility of episodic counterfactual thoughts. Psychological Science, 24(7), 1329–1334.

De Vries, M., Holland, R. W., Corneille, O., Rondeel, E., & Witteman, C. L. M. (2012). Mood effects on dominated choices: Positive mood induces departures from logical rules. Journal of Behavioral Decision Making, 25(1), 74–81. https://doi.org/10.1002/bdm.716

Demir, B., & Kumkale, G. T. (2013). Individual differences in willingness to become an organ donor: A decision tree approach to reasoned action. Personality and Individual Differences, 55(1), 63–69.

El-Leithy, S., Brown, G., & Robbins, I. (2006). Counterfactual thinking and posttraumatic stress reactions. Journal of Abnormal Psychology, 115, 629–635. https://doi.org/10.1037/0021-843X.115.3.629

Epstude, K., & Roese, N. J. (2008). The functional theory of counterfactual thinking. Personality and Social Psychology Review, 12(2), 168–192.

Epstude, K., & Roese, N. J. (2011). When goal pursuit fails: The functions of counterfactual thought in intention formation. Social Psychology, 42(1), 19.

Erdur Baker, Ö., & Bugay Tuna, A. (2012). The Turkish version of the Ruminative Response Scale An examination of its reliability and validity.

Ergen, İ., & Gülgöz, S. (2022). Mood regulation upon remembering open memories. Memory, 0(0), 1–10. https://doi.org/10.1080/09658211.2022.2156545

Feng, X., Gu, R., Liang, F., Broster, L. S., Liu, Y., Zhang, D., & Luo, Y. (2015). Depressive states amplify both upward and downward counterfactual thinking. International Journal of Psychophysiology : Official Journal of the International Organization of Psychophysiology. https://doi.org/10.1016/j.ijpsycho.2015.04.016

Ferdek, M. A., van Rijn, C. M., & Wyczesany, M. (2016). Depressive rumination and the emotional control circuit: An EEG localization and effective connectivity study. *Cognitive, Affective, & Behavioral Neuroscience*, *16*(6), 1099–1113. https://doi.org/10.3758/s13415-016-0456-x

Finnbogadóttir, H., & Thomsen, D. K. (2013). Does maladaptive repetitive thinking affect characteristics of mental time travel? Nordic Psychology, 65(2), 137–165.

Folkman, S., Lazarus, R. S., Gruen, R. J., & DeLongis, A. (1986). Appraisal, coping, health status, and psychological symptoms. Journal of Personality and Social Psychology, 50(3), 571.

Gamboz, N., De Vito, S., Brandimonte, M. A., Pappalardo, S., Galeone, F., Iavarone, A., & Della Sala, S. (2010). Episodic future thinking in amnesic mild cognitive impairment. Neuropsychologia, 48(7), 2091–2097.

Gavanski, I., & Wells, G. L. (1989). Counterfactual processing of normal and exceptional events. Journal of Experimental Social Psychology, 25(4), 314–325. https://doi.org/10.1016/0022-1031(89)90025-5

Gilbar, O., & Hevroni, A. (2007). Counterfactuals, coping strategies and psychological distress among breast cancer patients. Anxiety, Stress, and Coping, 20(4), 383–392.

Gleicher, F., Boninger, D. S., Strathman, A., Armor, D., Hetts, J., & Ahn, M. (2014). With an eye toward the future: The impact of counterfactual thinking on affect, attitudes, and behavior. In What might have been (pp. 295–316). Psychology Press.

Greenberg, D. L., & Knowlton, B. J. (2014). The role of visual imagery in autobiographical memory. Memory & Cognition, 42(6), 922–934.

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. Journal of Personality and Social Psychology, 85(2), 348–362. https://doi.org/10.1037/0022-3514.85.2.348

Grossheinrich, N., Firk, C., Schulte-Rüther, M., Von Leupoldt, A., Konrad, K., & Huestegge, L. (2018). Looking while unhappy: A mood-congruent attention bias toward sad adult faces in children. Frontiers in Psychology, 2577.

Grysman, A., Prabhakar, J., Anglin, S. M., & Hudson, J. A. (2015). Self-enhancement and the life script in future thinking across the lifespan. Memory, 23(5), 774–785.

Guajardo, N. R., Parker, J., & Turley-Ames, K. (2009). Associations among false belief understanding, counterfactual reasoning, and executive function. British Journal of Developmental Psychology, 27(3), 681–702.

Harris, C. B., Rasmussen, A. S., & Berntsen, D. (2014). The functions of autobiographical memory: An integrative approach. Memory, 22(5), 559–581.

Howlett, J. R., & Paulus, M. P. (2013). Decision-making dysfunctions of counterfactuals in depression: Who might I have been? Frontiers in Psychiatry, 4, 143.

Johnson, M. K., Foley, M. A., Suengas, A. G., & Raye, C. L. (1988). Phenomenal characteristics of memories for perceived and imagined autobiographical events. Journal of Experimental Psychology: General, 117(4), 371.

Joormann, J., & Gotlib, I. H. (2010). Emotion regulation in depression: Relation to cognitive inhibition. Cognition and Emotion, 24(2), 281–298.

Kahneman, D. (2014). Varieties of counterfactual thinking. In What might have been (pp. 387–408). Psychology Press.

Kahneman, D., & Miller, D. T. (1986). Norm theory: Comparing reality to its alternatives. Psychological Review, 93(2), 136–153. https://doi.org/10.1037/0033-295X.93.2.136

Kasimatis, M., & Wells, G. L. (1995). Individual differences in counterfactual thinking. In What might have been: The social psychology of counterfactual thinking (pp. 81–101). Lawrence Erlbaum Associates, Inc.

Kennedy, C., Deane, F. P., & Chan, A. Y. (2021). "What Might Have Been…" Counterfactual Thinking, Psychological Symptoms and Posttraumatic Growth When a Loved One is Missing. Cognitive Therapy and Research, 45(2), 322–332.

Kircanski, K., Joormann, J., & Gotlib, I. H. (2012). Cognitive aspects of depression. Wiley Interdisciplinary Reviews: Cognitive Science, 3(3), 301–313.

Kray, L. J., Galinsky, A. D., & Wong, E. M. (2006). Thinking within the box: The relational processing style elicited by counterfactual mind-sets. Journal of Personality and Social Psychology, 91(1), 33.

Kray, L. J., George, L. G., Liljenquist, K. A., Galinsky, A. D., Tetlock, P. E., & Roese, N. J. (2010). From what might have been to what must have been: Counterfactual thinking creates meaning. Journal of Personality and Social Psychology, 98(1), 106.

Lask, L. S., Moyal, N., & Henik, A. (2021). Rumination, emotional intensity and emotional clarity. Consciousness and Cognition, 96, 103242.

Lazarus, R. S. (1966). Psychological stress and the coping process.

Lazarus, R. S., & Folkman, S. (1984). Stress, appraisal, and coping. Springer publishing company.

Lazarus, R. S., & Launier, R. (1978). Stress-related transactions between person and environment. In Perspectives in interactional psychology (pp. 287–327). Springer.

Lemogne, C., Piolino, P., Friszer, S., Claret, A., Girault, N., Jouvent, R., Allilaire, J.-F., &Fossati, P. (2006). Episodic autobiographical memory in depression: Specificity, autonoetic consciousness, and self-perspective. Consciousness and Cognition, 15(2), 258–268.

Liberman, N., Sagristano, M. D., & Trope, Y. (2002). The effect of temporal distance on level of mental construal. Journal of Experimental Social Psychology, 38(6), 523–534.

Liberman, N., Trope, Y., & Stephan, E. (2007). Psychological distance.

Markman, K. D., Gavanski, I., Sherman, S. J., & McMullen, M. N. (1993). The mental simulation of better and worse possible worlds. Journal of Experimental Social Psychology, 29(1), 87–109.

Markman, K. D., Gavanski, I., Sherman, S. J., & McMullen, M. N. (1995). The impact of perceived control on the imagination of better and worse possible worlds. Personality and Social Psychology Bulletin, 21(6), 588–595.

Markman, K. D., & McMullen, M. N. (2003). A Reflection and Evaluation Model of Comparative Thinking. Personality and Social Psychology Review, 7(3), 244–267. https://doi.org/10.1207/S15327957PSPR0703_04

Markman, K. D., McMullen, M. N., & Elizaga, R. A. (2008). Counterfactual thinking, persistence, and performance: A test of the reflection and evaluation model. Journal of Experimental Social Psychology, 44(2), 421–428.

Markman, K. D., McMullen, M. N., Elizaga, R. A., & Mizoguchi, N. (2006). Counterfactual thinking and regulatory fit. Judgment and Decision Making, 1(2), 98.

McGinnis, D., & Roberts, P. (1996). Qualitative characteristics of vivid memories attributed to real and imagined experiences. The American Journal of Psychology, 59–77.

McMullen, M., & Markman, K. (2000). Downward Counterfactuals and Motivation: The Wake-Up Call and the Pangloss Effect. Personality and Social Psychology Bulletin, 26. https://doi.org/10.1177/0146167200267005

McMullen, M. N., Markman, K. D., & Gavanski, I. (1995). Living in neither the best nor worst of all possible worlds: Antecedents and consequences of upward and downward counterfactual thinking. What Might Have Been: The Social Psychology of Counterfactual Thinking, 133–167.

Mitchell, M. A., Contractor, A. A., Dranger, P., & Shea, M. T. (2016). Unique relations between counterfactual thinking and DSM–5 PTSD symptom clusters. Psychological Trauma: Theory, Research, Practice, and Policy, 8(3), 293.

Morris, M. W., & Moore, P. C. (2000). The lessons we (don't) learn: Counterfactual thinking and organizational accountability after a close call. Administrative Science Quarterly, 45(4), 737–765.

Myers, A. L., McCrea, S. M., & Tyser, M. P. (2014). The role of thought-content and mood in the preparative benefits of upward counterfactual thinking. Motivation and Emotion, 38(1), 166–182.

Nolen-Hoeksema, S. (2000). The role of rumination in depressive disorders and mixed anxiety/depressive symptoms. Journal of Abnormal Psychology, 109(3), 504.

Nolen-Hoeksema, S., & Morrow, J. (1991). A prospective study of depression and posttraumatic stress symptoms after a natural disaster: The 1989 Loma Prieta Earthquake. Journal of Personality and Social Psychology, 61(1), 115.

Öner, S. (2021). Emotionality and Valence in Autobiographical Remembering. Psikiyatride Guncel Yaklasimlar, 13(3), 605–618.

Özbek, M., Bohn, A., & Berntsen, D. (2017). Imagining the personal past: Episodic counterfactuals compared to episodic memories and episodic future projections. Memory & Cognition, 45(3), 375–389.

Page, C. M., & Colby, P. M. (2003). If only I hadn't smoked: The impact of counterfactual thinking on a smoking-related behavior. Psychology & Marketing, 20(11), 955–976.

Peterson, C., & Seligman, M. E. (2004). Character strengths and virtues: A handbook and classification (Vol. 1). Oxford University Press.

Phelan, S. M., Griffin, J. M., Jackson, G. L., Zafar, S. Y., Hellerstedt, W., Stahre, M., Nelson, D., Zullig, L. L., Burgess, D. J., & van Ryn, M. (2013). Stigma, perceived blame, self-blame, and depressive symptoms in men with colorectal cancer. Psycho-Oncology, 22(1), 65–73. https://doi.org/10.1002/pon.2048

Pillemer, D. B. (2009). Momentous events, vivid memories. Harvard University Press.

Rasmussen, A. S., & Berntsen, D. (2009). Emotional valence and the functions. Memory & Cognition, 37(4), 477–492.

Roese, N. J. (1994). The functional basis of counterfactual thinking. Journal of Personality and Social Psychology, 66(5), 805.

Roese, N. J. (1997). Counterfactual thinking. Psychological Bulletin, 121(1), 133.

Roese, N. J., & Epstude, K. (2017). The functional theory of counterfactual thinking: New evidence, new challenges, new insights. In Advances in experimental social psychology (Vol. 56, pp. 1–79). Elsevier.

Roese, N. J., Epstude, K. A. I., Fessel, F., Morrison, M., Smallman, R., Summerville, A., Galinsky, A. D., & Segerstrom, S. (2009). Repetitive regret, depression, and anxiety: Findings from a nationally representative survey. Journal of Social and Clinical Psychology, 28(6), 671–688.

Roese, N. J., & Morrison, M. (2009). The Psychology of Counterfactual Thinking. Historical Social Research / Historische Sozialforschung, 34(2 (128)), 16–26.

Roese, N. J., & Olson, J. M. (1995). Outcome controllability and counterfactual thinking. Personality and Social Psychology Bulletin, 21(6), 620–628.

Roese, N. J., & Olson, J. M. (2014). What might have been: The social psychology of counterfactual thinking. Psychology Press.

Roley, M. E., Claycomb, M. A., Contractor, A. A., Dranger, P., Armour, C., & Elhai, J. D. (2015). The relationship between rumination, PTSD, and depression symptoms. Journal of Affective Disorders, 180, 116–121.

Rubin, D. C., Berntsen, D., & Bohni, M. K. (2008). A memory-based model of posttraumatic stress disorder: Evaluating basic assumptions underlying the PTSD diagnosis. Psychological Review, 115(4), 985.

Rubin, D. C., Schrauf, R. W., & Greenberg, D. L. (2003). Belief and recollection of autobiographical memories. Memory & Cognition, 31(6), 887–901.

Rubin, D. C., & Siegler, I. C. (2004). Facets of personality and the phenomenology of autobiographical memory. Applied Cognitive Psychology: The Official Journal of the Society for Applied Research in Memory and Cognition, 18(7), 913–930.

Rye, M. S., Cahoon, M. B., Ali, R. S., & Daftary, T. (2008). Development and validation of the counterfactual thinking for negative events scale. Journal of Personality Assessment, 90(3), 261–269.

Sanna, L. J., Chang, E. C., & Meier, S. (2001). Counterfactual Thinking and Self-Motives. Personality and Social Psychology Bulletin, 27(8), 1023–1034. https://doi.org/10.1177/0146167201278009

Sanna, L. J., Meier, S., & Wegner, E. A. (2001). Counterfactuals and motivation: Mood as input to affective enjoyment and preparation. British Journal of Social Psychology, 40(2), 235–256. https://doi.org/10.1348/014466601164830

Sanna, L. J., & Turley-Ames, K. J. (2000). Counterfactual intensity. European Journal of Social Psychology, 30(2), 273–296.

Sanna, L. J., Turley-Ames, K. J., & Meier, S. (1999). Mood, self-esteem, and simulated alternatives: Thought-provoking affective influences on counterfactual direction. Journal of Personality and Social Psychology, 76(4), 543.

Schacter, D. L., & Addis, D. R. (2007). The cognitive neuroscience of constructive memory: Remembering the past and imagining the future. Philosophical Transactions of the Royal Society B: Biological Sciences, 362(1481), 773–786.

Schacter, D. L., Benoit, R. G., De Brigard, F., & Szpunar, K. K. (2015). Episodic future thinking and episodic counterfactual thinking: Intersections between memory and decisions. Neurobiology of Learning and Memory, 117, 14–21. https://doi.org/10.1016/j.nlm.2013.12.008

Schnall, S., Jaswal, V. K., & Rowe, C. (2008). A hidden cost of happiness in children. Developmental Science, 11(5), F25–F30.

Schoofs, H., Hermans, D., & Raes, F. (2010). Brooding and reflection as subtypes of rumination: Evidence from confirmatory factor analysis in nonclinical samples using the Dutch Ruminative Response Scale. Journal of Psychopathology and Behavioral Assessment, 32(4), 609–617.

Schwarz, N. (1990). Feelings as information: Informational and motivational functions of affective states. The Guilford Press.

Schwarz, N. (2012). Feelings-as-information theory. Handbook of Theories of Social Psychology, 1, 289–308.

Schwarz, N., & Bohner, G. (1996). Feelings and their motivational implications: Moods and the action sequence. The Psychology of Action: Linking Cognition and Motivation to Behavior, 2, 527–561.

Seta, C., Seta, J., Mcelroy, T., & Hatz, J. (2008). Regret: The Roles of Consistency-Fit and Counterfactual Salience. Social Cognition - SOC COGNITION, 26, 700–719. https://doi.org/10.1521/soco.2008.26.6.700

Söderlund, H., Moscovitch, M., Kumar, N., Daskalakis, Z. J., Flint, A., Herrmann, N., & Levine, B. (2014). Autobiographical episodic memory in major depressive disorder. Journal of Abnormal Psychology, 123(1), 51.

Stanley, M. L., Parikh, N., Stewart, G. W., & De Brigard, F. (2017). Emotional intensity in episodic autobiographical memory and counterfactual thinking. Consciousness and Cognition, 48, 283–291. https://doi.org/10.1016/j.concog.2016.12.013

Szpunar, K. K. (2010). Episodic future thought: An emerging concept. Perspectives on Psychological Science, 5(2), 142–162.

Szpunar, K. K., Spreng, R. N., & Schacter, D. L. (2014). A taxonomy of prospection: Introducing an organizational framework for future-oriented cognition. Proceedings of the National Academy of Sciences, 111(52), 18414–18421.

Taylor, S. E., & Brown, J. D. (1988). Illusion and well-being: A social psychological perspective on mental health. Psychological Bulletin, 103(2), 193.

Teigen, K., & Jensen, T. (2011). Unlucky Victims or Lucky Survivors?: Spontaneous Counterfactual Thinking by Families Exposed to the Tsunami Disaster. European Psychologist, 16, 48–57. https://doi.org/10.1027/1016-9040/a000033

Treynor, W., Gonzalez, R., & Nolen-Hoeksema, S. (2003). Rumination Reconsidered: A Psychometric Analysis. Cognitive Therapy and Research, 27(3), 247–259. https://doi.org/10.1023/A:1023910315561

Troy, A. S., Shallcross, A. J., & Mauss, I. B. (2013). A person-by-situation approach to emotion regulation: Cognitive reappraisal can either help or hurt, depending on the context. Psychological Science, 24(12), 2505–2514.

Tulving, E. (1983). Elements of episodic memory.

Van Hoeck, N., Ma, N., Ampe, L., Baetens, K., Vandekerckhove, M., & Van Overwalle, F. (2013). Counterfactual thinking: An fMRI study on changing the past for a better future. Social Cognitive and Affective Neuroscience, 8(5), 556–564.

Wang, Y.-L., Lin, Y.-C., Huang, C.-L., & Yeh, K.-H. (2012). Benefitting from a different perspective: The effect of a complementary matching of psychological distance and habitual perspective on emotion regulation. Asian Journal of Social Psychology, 15(3), 198–207.

Waytz, A., Hershfield, H. E., & Tamir, D. I. (2015). Mental simulation and meaning in life. Journal of Personality and Social Psychology, 108(2), 336.

White, K., & Lehman, D. R. (2005). Looking on the bright side: Downward counterfactual thinking in response to negative life events. Personality and Social Psychology Bulletin, 31(10), 1413–1424.

Williams, J. M. G., Barnhofer, T., Crane, C., Herman, D., Raes, F., Watkins, E., & Dalgleish, T. (2007). Autobiographical memory specificity and emotional disorder. Psychological Bulletin, 133(1), 122.

Wilson, A., & Ross, M. (2003). The identity function of autobiographical memory: Time is on our side. Memory, 11(2), 137–149.

Wisco, B. E., & Nolen-Hoeksema, S. (2010). Valence of autobiographical memories: The role of mood, cognitive reappraisal, and suppression. Behaviour Research and Therapy, 48(4), 335–340.

Yurtsever, G. (2008). Negotiators' profit predicted by cognitive reappraisal, suppression of emotions, misrepresentation of information, and tolerance of ambiguity. Perceptual and Motor Skills, 106(2), 590–608.

Zeelenberg, M. (1999). Anticipated regret, expected feedback and behavioral decision making. Journal of Behavioral Decision Making, 12(2), 93–106.

APPENDIX A: AUTOBIOGRAPHICAL MEMORY RECALL

Sizin için çok önemli biri tarafından anlaşılmadığınızı düşündüğünüz yakın geçmişteki bir ânı düşünün. Özellikle sevgi, yakınlık, anlayış beklediğiniz bir zamanda anlaşılmadığınızı, size önem verilmediğini düşünerek üzüldüğünüz bir olayı hatırlamaya çalışın.

Bu olay, sizin içinizde henüz çözülmemiş, hatırladığınızda hala yoğun duygular hissettiren bir olay olmalı. Lütfen nispeten yakın zamana ait, çözülmediğini düşündüğünüz ve sizi hâlâ çok üzmeye devam eden böyle bir olayı aşağıdaki boşluğa yazın.

APPENDIX B: EPISODIC COUNTERFACTUAL THOUGHTS

B.1. Upward Counterfactual Thinking:

İnsanlar yaşadığı olumsuz durumlar karşısında zihinlerinde "Eğer böyle olsaydı..." ya da "Eğer böyle yapsaydım" diye düşünerek olayın nasıl daha olumlu sonuçlanabileceğine dair alternatif senaryolar kurarlar. Örneğin, bir araba kazasından sonra "Eğer bu kadar hızlı gitmeseydim bu kazayı yaşamazdım." diye düşünebilir.

Şimdi az önce yazdığınız anınızı düşünün ve bu olayın sonucunu daha olumlu hale getirebileceğini düşündüğünüz "Eğer böyle..." diye başlayan cümlelerinizi lütfen yazınız. (Lütfen en az 3 madde sıralayınız.).

B.2. Downward Counterfactual Thinking:

İnsanlar yaşadığı olumsuz durumlar karşısında zihinlerinde "Eğer böyle olsaydı..." ya da "Eğer böyle yapsaydım" diye düşünerek olayın nasıl daha olumsuz sonuçlanabileceğine dair alternatif senaryolar kurarlar.(örn; eğer son anda frene basmasaydım ölebilirdim.)' diye düşünebilir.

Şimdi, az önce yazdığınız anınızı düşünün ve bu olayın sonucunu daha olumsuz hale getirebileceğini düşündüğünüz 'Eğer böyle…' diye başlayan cümlelerinizi lütfen yazınız. (Lütfen en az 3 madde listeleyiniz.)

APPENDIX C: PHENOMENOLOGY QUESTIONS

1. Bu olayın sizin üzerinizdeki etkisi nasıl?	Çok Olumsuz	Olumsuz	Ne olumlu Ne olumsuz	Olumlu	Çok olumlu
2. Bu olayı hatırlarken ne derece yoğun duygular hissediyorsunuz?	1 Hiç	2	3	4	5 Oldukça Fazla
3. Hatırladığınızda ne derece olayı yeniden yaşıyormuş gibi hissediyorsunuæz?	1 Hiç	2	3	4	5 Oldukça Fazla

1) Bu olayı zihninizde canlandırdığınızda hissettiğiniz duyguları değerlendiriniz.	Çok Olumsuz	Olumsuz	Ne olumlu Ne olumsuz	Olumlu	Çok olumlu
2. Bu olayı zihnimde canlandırdığımda yoğun duygular hissediyorum.	1 Hiç	2	3	4	5 Oldukça Fazla
3. Bu olayı zihnimde canlandırdığımda, şuan yaşıyormuş gibi hissediyorum.	1	2	3	4	5
4. Bu olayı zihnimde canlandırdığımda, onu zihnimde görebiliyorum.	1	2	3	4	5

APPENDIX D: RUMINATIVE RESPONSE SCALE (Short Version)

İnsanlar kötü bir deneyim yaşadıklarında bir sürü farklı şey yapar ya da düşünürler. Lütfen aşağıdaki cümleleri okuyup, son iki hafta içinde, belirtilenleri ne kadar sıklıkta yaptığınızı işaretleyin. Lütfen, ne yapmanız gerektiğini değil, gerçekte ne yaptığınızı belirtin.)

1- Hiçbir zaman

2- Bazen

3- Çoğunlukla

4- Her zaman

1.Bunu hak etmek için ne yapıyorum" diye düşünürüm.				
2.Yakın zamanda yaşadığım olayları sorgulayarak neden üzgün olduğumu anlamaya çalışırım.				
3.Niye hep böyle tepki veriyorum diye düşünürüm.				
4.Tek başıma kalıp neden böyle hissettiğimi düşünürüm.				
5.Yakın zamanda yaşadığım bir olayı düşünüp neden daha iyi sonuçlanmadığını sorgularım.				
6.Başkalarında olmayan sorunlar neden bende var" diye düşünürüm.				
7.Olup bitenlerle niye daha iyi başa çıkamıyorum" diye düşünürüm.				
8.Niçin üzgün hissettiğimi anlayabilmek için kendi kişiliğimi incelerim.				
9.Hislerim hakkında düşünmek için tek başıma bir yerlere giderim.				
10.Düşüncelerimi yazıp, çözümlemeye ve anlamaya çalışırım.				

APPENDIX E: EMOTION REGULATION SCALE

Aşağıda insanların duygularını kontrol etmekte kullandıkları bazı yöntemler verilmiştir. Lütfen her durumu dikkatlice okuyunuz ve her birinin sizin için ne

kadar doğru olduğunu içtenlikle yanıtlayınız.

1- Hiç doğru değil

2- Çok az doğru değil

3- Bazen doğru

4- Kısmen doğru

5- Oldukça doğru

6- Tamamen dogru

1. Duygularımı içinde bulunduğum durum hakkındaki düşüncelerimi değiştirerek kontrol ederim	1	2	3	4	5	6
2. Hissettiğim olumsuz duyguları azaltmak istediğimde, içinde bulunduğum durum hakkındaki düşüncelerimi değiştiririm.						
3. Hissettiğim olumlu duyguları arttırmak istediğimde, içinde bulunduğum durum hakkındaki düşüncelerimi değiştiririm						
4. Hissettiğim olumlu duyguları (sevinç veya eğlence/coşku gibi) arttırmak istediğimde, düşündüğüm şeyleri değiştiririm.						
5. Hissettiğim olumsuz duyguları (üzüntü veya kızgınlık gibi) azaltmak istediğimde, düşündüğüm şeyleri değiştiririm						
6. Stres yaratan bir durumla karşılaştığımda, sakin kalmama yardımcı olacak şekilde düşünmeye çalışırım.						
7. Duygularımı onları belli etmeyerek kontrol ederim						
8. Olumsuz duygular hissettiğimde, onları belli etmemek için elimden geleni yaparım.						
9. Duygularımı kendime (içimde) saklarım.						

10. Olumlu duygular hissettiğimde, onları belli etmemeye özen gösteririm.						

APPENDIX F: RELIGIOSITY SCALE

Lütfen, her bir ifadeye ne derece katılıp katılmadığınızı belirtiniz.

1- Kesinlikle Katılmıyorum

2- Katılmıyorum

3- Biraz Katılmıyorum

4- Kararsızım

5- Biraz Katılıyorum

6- Katılıyorum

7- Tamamen Katılıyorum

1. Evrensel bir güce ya da Tanrıya inanırım.	1	2	3	4	5	6	4
2. İnançlarımın benim hayatımı önemli kıldığını düşünürüm.							
3. Benliğimin oluşmasında inancımın rolü büyüktür.							
4. Maneviyatı yüksek bir insanım.							
5. Hayatta her şeyin bir sebebi olduğuna inanırım.							
6. Mutlak bir tanrıya inanmam.							
7. Kendimi dindar biri olarak görüyorum.							
8. Düzenli ibadet ederim.							
9. Dini kurallara uymanın gerekli olduğunu düşünüyorum.							

10. İnancımın gerektirdiklerini yapmaya çalışırım.							

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Istanbul Şehir University, Istanbul,

B.A. - Sociology (double major) (2018-2020)

Marmara University, Istanbul, Turkey

Publications

Bilgin, E., Öner, S. & Caglar, E. Seyma. (2023) "Which Memories Make Us Stronger? Growth from the Pandemic-Related Trauma Among COVID-19 Frontline Healthcare Workers." *Stress and Health*.

Conference Presentations

Kurtulmus, E. Ş., Altundal, M., Öner, S. "Mnemonic emotion regulation: The role of visual perspective and emotion type." The Society for Applied Research in Memory and Cognition, 14th Biennial meeting in Nagoya, Japan, 9 - 12 August 2023 (SARMAC 2023).

Kurtulmus, E. Ş., Altundal, M., Öner, S. "Mnemonic emotion regulation: The role of visual perspective and emotion type." The 9th International Symposium on Brain and Cognitive Science (ISBCS), Özyeğin University, May 7.

Kurtulmuş, E. Ş., Öner, S. "The Dysfunctional Effect of Episodic Counterfactual Thinking on Emotion Regulation." 2022 Annual Meeting of the Psychonomic Society, November 17, 2022.

Kurtulmuş, E. Ş., Öner, S. "Exploring the Impact of Episodic Counterfactuals on Mood through the Lens of Memory Phenomenology." Istanbul Sabahattin Zaim University 3rd Social Sciences Graduate Students Congress, 4-5 July, 2022.

Kurtulmuş, E. Ş. "The Examination of Episodic Counterfactual Thoughts under Positive Mood Manipulation." Harvard Women in Psychology Trends in Psychology Summit, November 12, 2021.

Kurtulmuş, E. Ş., Özlü, S., Aydemir S., Öner, S. "Recollection & Traumatic Growth: Unique Mediational Pathways Through Traumatic Stress Components." Proceedings paper and poster presentation at CogSci 2021, July 26-29, 2021.

Professional Experience

Research Assistant (August 2022-May 2023)
Kadir Has University, Memory and Emotion Lab
TÜBİTAK 3501 grant project: "Investigating Autobiographical Recalling in the Context of the Emotion Regulation of Negative Emotions."

Research Assistant (October 2020-March 2021)
Kadir Has University, Memory and Emotion Lab
TÜBİTAK 1001 grant project: "Covid-19's Traumatic Effect on Healthcare Professionals."

Internship (December 2017-January 2018)
Üsküdar Municipal Knowledge Houses (Üsküdar Bilgi Evleri), Istanbul

Teaching Assistant

Kadir Has University (TA)

Research Methods in Psychology II (Spring 2023)

Physiological Psychology (Fall 2022).

Research Methods in Psychology II (Spring 2022)

Other Training

Apr 2022- Child-Centered Play Therapy,

APT (Association for Play Therapy) approved training

Birgül Emiroğlu Bakay / Çatı Psikoloji (catipsikoloji.com).

Community Engagement

Volunteer Psychologist (May 2022)

Laughter Heals Association (gulmekiyilestirir.org.tr/en)

Volunteer Assistant (Oct 2018; May 2019)

EU Horizon 2020 Project: "STRENGTHS Project (Scaling Up Psychological Interventions with Syrian Refugees)."

Trauma and Stress Research Lab

İstanbul Şehir University.

Volunteer Assistant (March 2018-May 2018)

Yeryüzü Çocukları Association (Yeryüzü Çocukları Derneği), Istanbul, Turkey (yeced.org)

Honors and Awards

2022 Scholarship, TÜBITAK 3501 grant project.

2020 Academic Achievement Fellowship / Ministry of Youth and Sports, Directorate of Loans and Dorms (Kredi ve Yurtlar Genel Müdürlüğü)(2 years)

2020 Scholarship, Kadir Has University /School of Graduate Studies.

2015 Scholarship, İstanbul Şehir University (4 years).

Skills

Quantitative data analysis software

R; Mplus; JASP; Jamovi; SPSS; Amos

Statistics, Fall 2017 (undergraduate; A)

Advanced Statistics for Psychology, Spring 2018 (undergraduate; A)

Advanced Research Methods and Data Analysis-I, Fall 2020 (graduate; A)

Advanced Research Methods and Data Analysis-II, Spring 2021 (graduate; A)

Professional Membership

Psychonomic Society (Graduate Student)

Languages

English

Turkish (native)